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ABSTRACT

This document contains a project report and procedures manual from a project in which a group of junior colleges and postsecondary technical schools in Texas developed, pilot tested, and disseminated performance criterion-referenced occupational examinations for technical occupations. The report describes how teachers and industry personnel collaborated in developing the model and four competency-based examinations for the following subjects: drafting, electronics and instrumentation, food production, and microcomputer applications, as well as a model procedure manual for developing and conducting the examinations. The model procedure manual includes the following: (1) an introduction that explains the rationale for competency-based instruction and highlights pertinent sections of Perkins legislation that apply to technical education and competency-based testing; (2) a discussion of occupational competency testing; (3) directions for developing occupational competency examinations; and (4) eight appendixes--definitions; an example of a survey to validate tasks or competencies; samples of occupational examinations in computer science, drafting, food production, and electronics and instrumentation; project abstracts for seven U.S. Department of Education and Department of Labor grants; and a list of nine selected references. (KC)

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ED 365 872

Final Report

Model Procedure for Developing and Administering Competency Exams in Occupational/Technical Programs

Prepared by

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The Texas Higher Education Coordinating Board
Austin, Texas

CE065629

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Project Staff:	Victoria Oglesby, Project Administrator David Ingram, Principal Investigator Bill E. Lovelace, Project Researcher
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A very important "thank you" is extended to the program consultants who devoted many evenings and weekends developing the occupational exams in their program area. Consultants who contributed to the project results are as follows:

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EXECUTIVE SUMMARY

Paris Junior College with the assistance of three other two-year postsecondary institutions and/or tech prep consortiums conducted the project to develop, pilot test and disseminate performance criteria referenced occupational competency exam.

The overall goal of the project was to develop and demonstrate a model procedure that could be used by occupational instructors in community and technical colleges and tech prep consortiums in Texas, for developing and administering competency exams in targeted occupations other than those occupations requiring state licensure or certification.

The Carl D. Perkins Vocational Applied Technology Education Act Amendments of 1990, P. L. 101-392, implies a support of the use of competency exams in order to meet the requirements for using Perkins funds.

The TEXAS STATE PLAN FOR VOCATIONAL AND APPLIED TECHNOLOGY EDUCATION, fiscal year 1992-94 (state plan) outlines and describes how Perkins funds will be used by eligible secondary and postsecondary institutions in Texas to make Texas and the United States more competitive in the world economy by developing more fully the academic and occupational skills of all segments of the populations.

The occupational competency exams developed by this project were designed to evaluate a students attainment or mastery of specific occupational competencies of four selected technical/vocational program areas. The four technical/vocational programs areas for which the competency exams were developed by this project were: (1) drafting, (2) electronics/instrumentation, (3) food production, and (4) microcomputer applications.

The specific competencies and the criteria for evaluation were determined cooperatively by administrators and instructors at each program site with involvement of business and industry advisory committees.

1

INTRODUCTION

The development and maintenance of a quality workforce is imperative if the United States is to be competitive in a global economy. The responsibility for preparing and maintaining a competitive workforce requires a partnership between our educational system and business/industry.

The purpose of P.L. 101-392, THE CARL D. PERKINS VOCATIONAL AND APPLIED TECHNOLOGY EDUCATION ACT AMENDMENTS OF 1990, IS:

> To make the United States more competitive in the world economy by developing more fully the academic and occupational skills of all segments of the population.

The act also states:

> The purpose will be achieved principally through concentrating resources on improving educational programs leading to academic and occupational skill competencies needed to work in a technologically advanced society.

Perkins II (P.L. 101-392) The Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990, requires accountability of recipients of Perkins II funds. Each state administering Perkins II funds is required to develop and implement a statewide system of core standards and measures of performance for secondary and postsecondary vocational/technical education programs. The statewide system of core standards and measures of performance must include *measures of learning and attainment of academic and occupational competencies.*

In the revised definition of *coherent sequence of courses* of 34 CFR, it is stated: "The

Secretary believes that congress clearly intended that competency-based vocational programs be funded under the Act...." Based on these two requirements of Perkins II for accountability in terms of performance and competency-based programs, it is evident that performance measures and standards must relate to and be based on the occupational competencies of the workplace.

It is apparent that Perkins II requires the curriculum and instructional content of vocational/technical preparation programs be based on the competencies of the workplace. When the curricula and instructional content of a program are developed from the competencies of the workplace, the curricula are referred to as *competency-based curricula*.

The use of a competency-based curricula and the delivery of the curricula is supported by both mandate and implied mandate. The Technical and Vocational Program Guidelines - 1989 of the Texas Higher Education Coordinating Board (CB) advocate the use of competency-based curricula and instruction. The Guidelines provide the following definition:

> Competency-based education is designed to teach job related clusters of skills and knowledge, the mastery of which forms the basis upon which the student is evaluated; competency-based programs must possess the following characteristics:
>
> 1. Involvement of business and industry in the determination of the job competencies and the expected performance level required for successful employment within a defined job or cluster of jobs.
>
> 2. Course sequence which allows the mastery of competencies leading to the satisfactory performance of all identified competencies.

The above definition clearly directs that the curriculum and instructional content of postsecondary occupational preparation programs shall be competency-based.

Competency-based instruction in technical and vocational education has been described as an instructional delivery system that provides a process by which students develop

measurable performance competencies, specified by business and industry, that will assist students in obtaining gainful employment based on their ability to perform in a productive manner.

Student attainment of occupational competencies is measured by *demonstration* of mastery of competencies using a variety of methods rather than *performance* only on written tests and subsequent comparison to the performance of other students. Students are held accountable for mastery of each competency and may progress at their own rate.

A review of final reports of program improvement projects funded by the CB reveals progress has been made in developing competency-based curricula that adhere to the two characteristics of Competency-Based Instruction specified in the CB definition of competency-based education above. Other characteristics of competency-based instruction include:

- **Performance objectives are developed for the program.** There is one performance objective developed for each task/competency. In addition, enabling objectives are sometimes developed for each performance objective.
- **The student is informed of the required competencies prior to instruction.** The specific requirements and content of the program, course, and performance objectives are provided to the student prior to instruction.
- **Student achievement is based on demonstration of mastery of specified competencies.**
- **Criterion-referenced testing procedures are used to evaluate student progress and performance.**
- **Student competency profiles are maintained for purposes of program articulation, student application for employment, and permanent records.**
- **Learning time is flexible.**
- **Learning is guided by feedback.**

With business and industry demanding that entry-level employees be competent

occupationally, the national concern for educational accountability, and the need to serve special populations without "diluting" the curriculum, the concept of competency-based instruction is receiving considerable attention again. As we have seen with the use of buzzwords in other innovations and concepts, it has been popular to talk about competency-based instruction with enthusiasm even if it has not been well understood. Postsecondary technical and vocational education personnel in Texas are moving away from the conversational use of the concept and are in the process of moving toward a phase of design, actualization, and implementation of a competency-based instruction system.

In the report, STATE ASSESSMENT, for Section 116 of Perkins II, prepared by the Texas Higher Education Coordinating Board, (there were two recommendations that imply the use of competency-based instruction in the achievement of the two recommendations). The two recommendations made for *Criteria Factor II: Sequential courses of study leading to both academic and occupational competencies* are:

3. Public community colleges and technical institutes should develop a periodic review process to ensure that applied basic work skills are incorporated into the curriculum of each technical program.

4. Public community colleges and technical institutes should develop a periodic assessment to ensure that competency-based instruction is incorporated in all programs.

The achievement of recommendation "4" stated above will require the development of a model for developing and administering competency exams that can be used by individual institutions for the periodic assessment of competency-based instruction.

Accountability of vocational education and job training is also a concern of the Employment and Training Administration of the U.S. Department of Labor. Accountability of job training programs has been an emphasis of training programs conducted under the provisions of the Joint Training Partnership Act for years. On March 18, 1992, the

Employment and Training Administration and the offices of Vocational and Adult Education jointly issued a notice of public meetings and a request for comments related to occupational skill standards. As a result of these public meetings, the U.S. Department of Labor and the U. S. Department of Education are cooperatively and independently funding national projects, by research and development activities to propose national standards for occupational competencies in industries and trades. An occupational skill standard or a *job-related skill standard* has been generally defined as the knowledge, skill, and level of ability needed to satisfactorily perform a given job or occupational competency.

In Texas, Governor Ann Richards has charged the Texas Department of Commerce to establish a Texas Skills Development Program. The purpose of the Texas Skills Development Program is to establish a *statewide method to make sure Texas workers have the skills business and industry need to market Texas goods and services in a global economy.* The Texas Skills Development program which was implemented in July of 1992 will ultimately identify skills of the workplace and the standards of the skills for skill certification requirements in Texas. It is anticipated that the Texas Skills Development Corporation will provide a mechanism for business, industry and labor to participate in the development and implementation of state-of-the-art competency curricula for secondary and postsecondary vocational/technical programs.

The accountability for Perkins II funds used to provide for occupational preparation of students is highlighted by the requirements for a state system of core standards and measures of performance for vocational/technical education programs. All of the states have developed a system of core standards and measures as required by Perkins II. However, it has been found that few of the states have specifically complied with the act in terms of the requirements of 34 CFR, 403.202, which states:

(a) The statewide system of core standards and measures of performance for vocational education programs must include-

(1) Measures of learning and competency gains, including student progress in the achievement of basic and more advanced academic skills...

Based on the previous citations, the Act mandates and implies that occupational preparation (vocational) instruction be *competency-based* and be delivered using *competency-based applied learning.*

The use of a *competency-based instruction system* has been found to be the best vehicle by which to deliver *competency-based applied learning.* The use of a competency-based instruction (CBI) system provides for measuring both student learning (progress) and competency attainment (proficiency).

In the PERFORMANCE MEASURES AND CORE STANDARDS FOR POST SECONDARY TECHNICAL EDUCATION PROGRAMS (CB, 1992), it is stated: "A measure is a description of an outcome, and a core standard is a desired level or rate of an outcome." These definitions are the same, with the exception of the word "desired," as the definitions provided in 34 CFR.

The use of the word "outcome" in the definitions of "measure" and "standard" for Perkins II adds confusion to the definitions since the word "outcome" has not been defined and "competency attainment" has been given as an example of a core performance measure in section 115.(b)(2) of P.L. 101-392. A dictionary review reveals that Webster has defined "outcome" as "something that follows as a result or consequence." The word "consequence" was defined as "something produced by a cause or necessarily following from a set of conditions."

An educational dictionary defined "outcome" as "change in behavior resulting from learning; not to be confused with *objective*, which is a desired result." After a review of the

definition of standards, measures, outcomes, and an example of a measure provided by Perkins II, it is concluded that a measure or a description of an outcome must be written in terms of specific performances expected of a student or program under prescribed conditions. Therefore, core measures, which are descriptions of outcomes, must be written in performance terms of what is expected of: (1) the student in relation to learning progress and competency attainment and (2) the program in relation to program objectives and goals.

As used in this project, attainment or mastery of an *occupational competency* using criteria of the workplace is considered a core measure of an expected student outcome. The "learning progress" could be another core measure description of an expected or established student outcome. In order to determine if the established student outcomes have been attained, it will be necessary to test or assess the student(s).

When a competency-based instruction (CBI) system is used to deliver the content of a competency-based curriculum, constant feedback from and to students concerning their individual learning progress is required. Therefore, students must be evaluated frequently to determine understanding of knowledge and performance of related tasks. In the test ITEM BANKING MANUAL, Dr. John Carnes stated:

> On the surface, student testing measures knowledge and skills. In addition, it provides important feedback concerning program accountability. Because test items are easily keyed to job tasks, student evaluation shows which areas of instruction are effective and where improvement is possible.
>
> Frequent and immediate feedback to students concerning their progress reinforces good instruction. Item Banking allows rapid generation of student evaluation instruments customized to student progress.

Test Item Banks are a very good tool for use in identifying and documenting student progress in learning of both academic and occupational skills. Test Item Banks will assist in achieving the Perkins requirement for measures of student learning or progress. Assessing

and documenting student attainment of occupational competencies cannot be sufficiently achieved only by the use of test items. Competency exams must be used to assess the attainment or mastery of an occupational competency by a student.

The above cited mandates and actions serve as notice to vocational/technical educators that they must immediately begin to assess and document vocational/technical students' occupational skill proficiency or occupational competency by using occupational competency exams.

II.

OBJECTIVES

The objectives of the project are:

a. Develop a model that may be used as a guide for developing administering occupational competency exams.

b. Pilot test the model at a minimum of four public two-year postsecondary institutions.

c. Revise the model and disseminate the competency exams developed by the pilot test.

d. Evaluate the project.

e. Prepare and submit reports.

III

PROCEDURES

PROJECT DESIGN

The design for conducting the project included four basic elements which were necessary for the achievement of the Coordinating Board's RFP 1100, B model programs. The design included: (1) communication and coordination with external organization, agencies, and individuals: (2) dissemination plan; (3) evaluation plan; (4) a plan of work; and (5) management plan.

1. External Communication and Coordination

In order to obtain essential input in relation to the evaluation of the design of survey forms, and summarization of the survey results, Paris Junior College maintained communication linkages with a variety of agencies and institutions through the use of a Project Advisory Committee (PAC). Communication linkages and coordination for input to the project was essential with representatives of agencies, organizations, and institutions that are involved in the preparation, implementation, and improvement of postsecondary technical/vocational occupations programs in Texas.

2. Dissemination Plan

Creating awareness and understanding of the project and the dissemination of the results of the project findings is crucial to the success of the project and the statewide benefits of potential users of the project results. If the proposed benefits anticipated by the Coordinating Board, of the project are to be realized, Texas public postsecondary institutions must be aware of the project's purposes, procedures, and results.

The basic dissemination was made by mail. Initial awareness was created by a flier

mailed to deans/directors of vocational/technical education and directors of tech prep consortia for which the curricula are being develop in Texas community/junior colleges and technical institutes and secondary schools. All requests for information resulting from the flier were answered by telephone.

3. Plan of Work for Year One

This section provides a description of the tasks performed in achieving the project objectives for year one.

Task 1. Create and Use a Project Advisory Committee (PAC)

The project advisory committee provided for external input to the project. The PAC was composed of EIGHT (8) voting members and one (1) non voting member (ex-officio). The nine (9) member committee was composed of:

- One director of a quality workforce planning region;
- One director of a each prep program;
- Two individuals from business and industry representing two of the occupations targeted by this project;
- Two deans/directors of occupation education programs;
- Two occupational instructors; and
- One person from the Texas Higher Education Coordinating Board, serving as an ex-officio member.

The PAC members served four major roles in the project: (1) as an advisory body to the project staff in selecting competencies for which the criterion reference exams were developed, (2) served as reviewers and made recommendations for the finalization of all project products, (3) assisted in the field test of the competency exams developed by the project; and (4) assisted in the evaluation of the project.

The PAC met three times in carrying out their responsibilities to the project. The PAC was convened for its first meeting for one day in Austin for the purpose of:

(1) Making them knowledgeable about the project objectives and proposed products:

(2) Providing them with the results of previously reviewed literature:

(3) Developing procedures for obtaining their input; and

(4) Determining due dates for their input.

The second and third meetings were called meetings and held in Austin for committee review and input on project products.

Following the orientation meeting and with the exception of the called meetings all other communication was by mail or telephone. Minutes of Advisory Committee meeting are presented in Appendix A.

Task 2. Conduct Review of Literature

A review of the literature was conducted to identify (1) procedures for conducting performance exams and (2) previously developed criteria used in determining mastery of performance competencies in the workforce. The review of the literature was national in scope. The review included as a minimum: (1) research reports. (2) exam specimens. (3) handbooks, and (4) criterion referenced test materials. The review of the literature revealed previously identified and validated criterion and processes for the administration of the exams and validated criterion and processes for the administration of the exams essential to tech prep programs and competency-based instruction.

Task 3. Draft Model and Resource Manual:

The project staff and consultants, using their expertise as practitioners and the findings from the literature review developed a draft of the model criterion-referenced measures for each of the competencies selected by the PAC.

A draft of the model and resource manual was submitted to the PAC for review and approval. The model and resource manual was finalized based on the PAC and CB staff advisors approval and printed for validation.

The model and resources manual provided for the inclusion of a graphic illustration of the model and procedures for the development of:

A. The creation and use of occupational technical committees for developing and administering occupational competency exams.

B. Student Materials

- Student performance exam booklets
- Description of the competency being examined
- Specific instructions for the students
- List of equipment, materials required to perform the competency
- Estimated time for completing the exam
- Criteria for evaluation

C. Examiners Guide

- Specific instructions for examiner
- Competency to be evaluated
- Maximum time for the exam
- Criteria for determining mastery of competency
- List of materials and equipment required for procedures
- Suggestions for administering the exam
- Performance evaluation sheet
- Examiner's personal evaluation

D. Recommendations for Recording and Using the Results of the Exams

The drafts of the exam packets were submitted for approval of the PAC membership. The drafts were revised based on the recommendations of the PAC and prepared for validation.

Task 4. Field Test the Model and Resource Manual

The four postsecondary institutions who agreed to field test the model identified two occupational instructors, each who was responsible for the field test at their respective institutions.

The eight occupational instructors participated in a two day workshop to prepare them for the field test. Deans/directors of occupational programs and tech prep directors of the four collaborating institutions were invited to attend the workshops. Travel expenses for the eight occupational instructors to attend the workshop was reimbursed by the project.

Project staff and consultants who developed the model and resource manual conducted the workshop. Immediately following the workshop the occupational instructors (field test consultants) began to field test the model and resource manual. Each field test institution (site) was expected to develop and validate by administering a minimum of ten competency exams. Faculty of the validation sites were invited to observe and evaluate the administrations of the exams. Students taking the exams were requested to evaluate the exam process and the exams which they have taken.

The evaluations resulting from the administration of the exams were compiled and analyzed. The exams were revised based on evaluation findings and submitted to the PAC for approval. With the approval of the PAC the exams were submitted to the CB project advisor for approval. The exams were finalized based on the CB approval requirements and prepared for printing.

Task 5. Disseminate the Project Products

One-hundred copies each of the exams and the resource manual were printed. Twenty copies of each were sent to the CB. One copy of each of the exams and copy of the resource manual were mailed to the public community and technical colleges in Texas.

The products of this project:

Twenty occupational competency exams for the drafting program;

Twenty occupational competency exam for the electronics program;

Twenty occupational competency exams for microcomputing program;

Twenty occupational competency exams for the program of food productions; and the model or resource manual for developing occupational competency exams are presented as separate documents for this final report.

Task 6. Evaluate the Project

The project was evaluated on the basis of project installation, process and product using a third party evaluator. The evaluation report is presented in Appendix B.

Task 7. Prepare and Submit Reports to the Coordinating Board

In addition to the final project report and other reports required by the Coordinating Board interim reports and interim deliverables related to project products was submitted by the principal investigator (project director) to the CB project advisor and/or third party evaluator.

V

RESULTS AND ACCOMPLISHMENTS

Through the results of dedicated efforts on the part of the project staff the following results and accomplishments have been completed.

- Training was provided to eight instructors/consultants and one PAC member on the process and procedures of developing and administering competency exams.
- Disseminated copies of the competency exams to all community and technical colleges in Texas Institutions requesting additional copies will be provided the same at cost of reproduction.
- Disseminated the Procedures Manual to all community and technical colleges in Texas.
- Project staff was invited and participated on an AD HOC Task Group for the National Skills Development project in identifying skills for basic electronics.
- Provided information regarding program at region and area conferences.

V

PILOT TESTING FINDINGS

Factors that arose as the consultants/examiners piloted the exams with students:

1. Appropriateness of the time for exams.
2. The examiner must have a working knowledge of the material on the exam order to clarify questions before the exam begins.
3. The exams must be correlated with instruction.

   They can serve two proposes:

   a. Integrates instruction and learning with testing.

   b. Evaluation of instruction/learning.
4. Exam format and instructions were understandable and non-intimidating.
5. Assists the student in a better understanding of what is required for successful performance.
6. Improved the organization and quality of the evaluation program.
7. Communicates to the employer the evaluation procedures and standards.
8. Communicates to the employer the number of attempts that it took the student to master the tasks that are included in the competency.

VI

APPENDICES

APPENDICES A

MINUTES OF

ADVISORY COMMITTEE MEETING

MINUTES

Project Advisory Committee Meeting
Tuesday, April 20, 1993
10:00 a.m. until 2:00 p.m.
Building 5, Room 209
Austin, Texas

Members and Staff Present:

Dr. Doug Pickle
Dr. Harley Davis
Dr. Barry Russell
Dr. Sara Barnett
Mr. David Ingram
Dr. Bill Lovelace

Copies of the exams, as developed by the project consultants, had been mailed to advisory committee members prior to the meeting. They were asked to provide suggestions that would improve the format or content of the exams.

Suggestions received at the meeting were:

- Reformat the cover page of the student and examiner manual.
- Include additional instructional materials to the examiner's manual.
- On the competency exam rating sheet remove the "unsatisfactory" column and add column "number of attempts", per task, and add a third column where the date of completion for each task could be entered. A revised sample of the competency exam rating sheet will be included as an attachment to these minutes.

The rationale for these revisions was to document the number of times it took a student to master a task before being permitted to move on to the next task. The competencies within the program and tasks within the competency are designed from an "easy to difficult" or "simple to complex" structure and in competency based instruction/learning the student should not be permitted to progress to the next competency until he/she has demonstrated mastery of the proceeding competency. The same holds true for the tasks that are necessary to demonstrate mastery of the competency statement. If the competency has eight tasks that a student should perform, and he/she demonstrates mastery of the first four but is unable to perform task five, then further instruction/learning should occur relating to task five. The instructor/examiner, when the student indicates that he/she is ready to retake task five, should permit the student to do so and record on the rating sheet that it took the student two, three or more times to demonstrate mastery of task five. Date(s) of competition for each task will also be recorded on the rating sheet.

The committee felt that it is very important for employers to know that it took some students two, three or four tries to demonstrate mastery of a task, while other students might have demonstrated mastery of all tasks during the first examination.

Discussion was held, regarding ways and means of how best to get business and industry to utilize performance exams and results of performance exams. As more performance exams are developed in program areas and instructors utilize the exams and work with business and industry in establishing the criteria for mastery, the student competency examination rating sheet and the student competency profile will become more important and useful to employers. The actual competencies to be measured and the level of performance (mastery) for each competency of each technical/vocational program should be determined by each institution with the involvement of business and industry. The criteria for determining competency in the educational institution should be the same criteria that are used by business and industry to evaluate an employee's productivity and/or ability to perform.

Discussion was held regarding improvements in the "Resource Manual" as developed by the project staff. The following recommendations were made and will be included in the manual.

- Illustrations in the manual will relate to programs used in the project.
- Exams developed by the project will be used in the manual, rather than the samples originally included.

The "Resource Manual" will be revised and updated based on advisory committee and program consultants recommendations and mailed to advisory committee members and CB project advisor for final recommendations and/or approval at the next advisory committee meeting.

The committee was informed that the project staff was aware of the twenty grants awarded by the U. S. Department of Education and Labor, for developing national standards for competencies in industry and trades. Project staff will strive to keep abreast of these grant development activities to see if the work done by these grants might enhance the work being done by this project.

The committee was informed that a RFP had been submitted to the CB to continue the project for the 1993-94 fiscal year. The proposal stated that eight new program areas would be identified to develop, administer (pilot test) and disseminate to postsecondary community and technical colleges in Texas. Results would also be shared with interested tech-prep consortiums within the state.

There was strong support from advisory committee members present to continue the project. Committee members were asked about an approximate date for the next meeting. It was suggested that we consider the last week in May, rather than early June, so as not to conflict with summer school registration. Members will be contacted about a specific date(s).

David Ingram, expressed his appreciation for the committee's suggestions and recommendations and their continued support of the project.

There being no further business and/or discussion the meeting was adjourned.

Respectfully submitted,

David Ingram

MINUTES

Project Advisory Committee Meeting
Friday, May 28, 1993
10:00 a.m. until 2:00 p.m.
Texas Higher Education Coordinating Board
Building 5, Room 209
Austin, Texas

Members and Staff Present:

Mr. John Denison
Dr. Harley Davis
Dr. Barry Russell
Dr. Bill Lovelace
Mr. David Ingram
Dr. Ann Lopez, CBS Staff Advisor

The procedures manual on "Developing and Administering Competency Exams" was presented for final critique. After the review, there was a recommendation that minor changes be made prior to the final printing of the manual. The project staff will see that these changes are made. The manual will be printed and disseminated to the Coordinating Board and all two-year postsecondary and technical colleges in the state by the date of August 15, 1993.

The next item on the agenda was a review of the sample competency exams as revised. The changes that were recommended at the last meeting has been made and there were no other changes recommended. Project staff will compile all competency exams (20 for each program area) into a separate manual for each program area. Each competency examination consists of the following:

A. Student Manual
- Student performance exam booklet.
- Description of the competency being examined.
- Listing of facility, equipment and materials required to perform the competency.
- Time for completing the exam.
- Criteria for evaluation.

B. Examiners Manual
- Competency to be evaluated.
- Maximum time for the exam.
- Criteria for determining mastery of the competency.
- Listing of facility, materials and equipment required for to perform the competency.
- Performance evaluation sheet.
- Examiner's personal comments relating to the evaluation.

Upon final printing of the exam manuals, dissemination will be made to the Coordinating Board and to all two-year postsecondary and technical colleges in the state.

The committee was informed that the exams had been piloted by students in the four program areas during the Spring (1993) semester. The consultants/instructors utilized the students feedback to improve the exams in regards to length of time, exam instructions, etc.

David Ingram informed the committee that a questionnaire would be mailed to each committee member and that would assist the project's third party evaluator, in evaluating the project. Questionnaires are to be returned no later than June 15, 1993 to Dr. Sara Barnett, the project's third party evaluator.

Dr. Harley Davis and Dr. Barry Russell recommended that efforts should be made to market the project. Their suggestions were to make presentations at dean/directors conferences and through the tech-prep consortiums around the state. Efforts will be made to follow-up on these recommendations.

On behalf of Pairs Junior College and the project staff, Mr. Ingram expressed appreciation to the advisory committee for their help and assistance as project task and activities were carried out during the course of the year.

There being no further business and/or discussion the meeting was adjourned at 11:45 a.m.

Respectfully submitted,

David Ingram

MINUTES - AS REVISED

Project Advisory Committee Meeting
September 25, 1992
Texas Higher Education Coordinating Board
Austin, Texas

Members Present:

Dr. Harley Davis
Ms. Georgia Hankins
Dr. Jerry King
Ms. Brenda Lovett
Dr. Douglas Pickle
Mr. Al Pollard
Dr. Barry Russell

Staff Present:

Ms. Victoria Oglesby
Dr. Bill Lovelace
Mr. David Ingram

Coordinating Board Staff:

Mr. Ron Curry
Dr. Carrie Nelson

David Ingram, Project Director called the meeting to order at 10:00 a.m. and made introductions of the Project Staff, Project Advisory Committee members and the Coordinating Board staff representatives. There were no guests in attendance.

Ms. Victoria Oglesby extended a warm welcome to the group and on behalf of Paris Junior College expressed appreciation to the members for their willingness to serve as a project advisory committee.

Mr. Ingram related to the committee the project purpose, goals, objectives and project outcomes and benefits.

Project Purpose:

Paris Junior College with the assistance of three other two-year postsecondary institutions and/or tech-prep consortiums will conduct a project to develop, field test and disseminate performance criteria referenced competency exams. The level of performance (mastery) for each competency of each targeted technical/vocational program will be determined by administrators and instructors at each program site with involvement of business and industry.

Project Goal:

To develop and demonstrate a model procedure that can be used by occupational instructors in community and technical colleges in Texas, for developing and administering competency exams in occupational/technical programs in targeted occupations other than those occupations requiring state licensure or certification.

Project Objectives:

- Develop a model that may be used as a guide for developing and administering occupational competency exams.
- Field test the model at a minimum of four public two-year postsecondary institutions.
- Revise the model and disseminate the competency exams and resource manual developed by the field test.
- Evaluate the project.
- Prepare and submit reports.

Project Outcomes and Benefits:

A model or resource manual that may be used as a guide in the development and use of competency exams.

More than twenty occupational instructors and administrators will have developed and demonstrated skills in the preparation and use of occupational exams.

More than 40 competency exams will have been developed and tested for a minimum of four targeted occupations.

The committee was briefed on their roles and responsibilities, which includes:

- Serve as an advisory body to project staff in selecting programs and competencies for which the criterion referenced exams will be developed:
- Serve as reviewers and make recommendations for finalization of all products;
- Assist in the field test and validation of the competency exams developed by the project; and
- Assist in the evaluation of the project.

A general discussion followed on how to identify competencies for occupational programs. Mr. Ron Curry suggested that academic skills competencies be included in the

competency based criterion referenced exams. Dr. Barry Russell also recommended that academic/cognitive competencies be included in the occupational/technical programs.

Discussion then centered on the viewpoint of standards/criterion. Ms. Brenda Lovett related to the committee the work in progress by the Texas Skills Development Program conducted by the Workforce Development Division of the Texas Department of Commerce. She stated the skills development panel (representatives of business, industry and labor) has advised commerce that we need to "Socialize" the issue of skill standards with business and industry. They advised that business needs to better understand the issue of skill standards and the relationship to economic competitiveness. Other business persons have expressed concerns regarding government's role in skill standards. The consistent message from all business and industry organizations is that business (not education and training) must drive the standards setting process and that business and industry must define the outcomes they expect from education and training institutions.

Dr. Bill Lovelace and David Ingram stated that in working with the consultants and administrators from the four program areas, along with business and industry representatives that mastery criterion would be established for the identified competencies for each program area. This item of concern will be further discussed when the program consultants are identified. When all consultants from the four program areas are identified the project staff will establish dates and a place and conduct a two-day workshop on developing competency exams. Other institutions/program areas will be invited to attend and participate in the workshop. The only stipulation will be that each additional institution/tech-prep consortium pay their own expenses to the workshop and that they consent to submit their competency exams to project staff which will be included as a part of the final report.

Throughout the course of the meeting the staff and committee made referral to a list of definition of terms that had been prepared by project staff and included in the packet provided to committee members. The listing of terms, perhaps with some revision, will be made a part of the final report.

The agenda item program/curriculum areas for the project was the next item of discussion. Mr. Ingram explained that the drafting technology program at Paris Junior College would be one of the four programs to be included in the project. Other program recommendations included:

Electronics --- perhaps Victoria College
Computer Technology --- emphasis on micro computer applications
Office Technology

Dr. Douglas Pickle and Dr. Jerry King made the comment that the four occupational areas listed above were traditional programs and that they felt it might enhance the project to add a non-traditional program as one of the four. Recommended programs were:

Law Enforcement
Early Childhood
Food Production
Food and Fiber

Since the project is only budgeted to include four program areas, it was agreed that office technology be deleted from the list and that project staff work toward including one of the non-traditional programs as a part of the project. Project staff will immediately start making contacts to obtain commitment from other institutions for the three remaining programs to be included in the project.

Discussion was held regarding the selection of two people from business and industry to serve on the advisory committee. David Ingram made the recommendation that when the four program areas were identified that the two business and industry representatives be selected from state associations. Project staff will work with the PAC regarding these individuals.

Committee members were reminded to submit travel and per diem forms and appropriate receipts for reimbursement.

The committee was informed that a telephone poll would be made in scheduling the next meeting, but in the interval any drafts of products would be by mail.

There being no further discussion or business the meeting was adjourned at 1:30 p.m.

Respectfully submitted,

David Ingram

APPENDICES B

THIRD PARTY EVALUATION REPORT

THIRD PARTY EVALUATOR REPORT

RE: THE PROJECT TO
DEVELOP AND DEMONSTRATE A MODEL PROCEDURE
FOR DEVELOPING AND ADMINISTERING COMPETENCY EXAMS
IN OCCUPATIONAL/TECHNICAL PROGRAMS

This report is the evaluation of the project granted by the Texas Higher Education Coordinating Board and conducted by Paris Junior College with the assistance of three other two-year postsecondary institutions and/or tech-prep consortiums in cooperation with Project Staff and Project Advisory Committee members during the 1992-1993 project year to "Develop and Demonstrate a Model Procedure for Developing and Administering proposed objectives were as follows:

1) develop a model that may be used as a guide for developing and administering occupational competency exams,
2) field test the model at a minimum of four public two-year postsecondary institutions,
3) revise the model and disseminate the competency exams and resource manual developed by the field test,
4) evaluate the project, and
5) prepare and submit reports.

The project design included external communication and coordination, dissemination, installation/process/product evaluation, plan of work (consisting of seven tasks), the MBO system for overall management, a program plan organized into seven tasks, and project staff. The four program areas included in the project were as follows: Electronics and Instrumentation at Golden Crescent Tech-Prep Consortium, Victoria College; Drafting Technology at Paris Junior College; Microcomputer Applications in Computer Technology at Kilgore Junior College;

and Food Production at Central Texas Tech-Prep Consortium in Temple.

All questionnaires mailed to the eight program consultants were returned. The program consultants responded to the following questions:

1. Did the training workshop provide adequate information for constructing the exams?
2. Was the resource manual helpful in designing the exams?
3. As a program consultant, do you feel that recommendations made by project staff, advisory committee members and other program consultants for improving and/or conducting the project were used?
4. Based on information provided you by the project staff or other individuals, do you feel that the project objectives have been achieved?

More than half the responses were positive for the first questions; seventy-five percent of responses were positive for the second question; all responses were positive for question number three; eighty-eight percent of the responses were positive for the fourth question. Written comments indicated that the project was a worthwhile project; however, participants were under an extremely tight time schedule and had little time for feedback near the end of the project. The biggest concerns were related to the amounts of time required to obtain lists of competencies in some program areas and the time required to actually write the model exams.

Questionnaires were returned from five members of the Project Advisory Committee. All responses were positive to the following questions:

1. Did the Project Advisory Committee consist of members representing the organizations or institutions listed in the project proposal?

2. Was the Project Advisory Committee convened and used as proposed?
3. As a member of the Project Advisory Committee, do you feel that recommendations made by the members for improving and/or conducting the project were used?
4. Based on information provided you by the project staff or other individuals, do you feel that the project objectives have been achieved?

Comments from the Project Advisory Committee indicated that the project was both successful and necessary in the occupational/technical areas. The only negative aspect addressed was that greater participation\attendance by some members of the PAC and staff would have enhanced some of the meetings.

In evaluating the overall project, the proposed and actual timeframes were reviewed with a positive correlation between proposed and actual. The "Installation" portion of the evaluation related to the operational format for the Project Staff, Coordinating Board, and Project Advisory Committee -- these were established and used as planned. Tasks and activities also met timeframe guidelines. The items for "Process" evaluation included representative membership on the Project Advisory Committee as recommended by the RFP; timely reports; drafts/revised drafts and field tested/validated guides for developing and administering occupational competency exams. A shrink-wrapped final "Product" for each of the four program areas will be mailed to each two-year postsecondary institution in Texas; twenty copies of the final product will be sent to the Texas Higher Education Coordinating Board. This report by the third party evaluator is a part of the final product.

The third party evaluator was able to attend two meetings of

the PAC and was, therefore, able to observe some of the questions, spirited comments, frustrations as well as successes, and hands-on activities as the consultants began to develop a format for the competency exams. The revised drafts at the other PAC meeting attended by the third party evaluator demonstrated that consultants had, indeed, been successful in their endeavors to develop and demonstrate a model procedure for developing and administering competency exams in occupational/technical programs.

The third party evaluator has reviewed documentation on file for the project, has listened to questions and comments, and has observed the manner with which the project staff, the PAC, and the consultants have successfully tackled a time consuming, yet timely task. Based on these observations, the third party evaluator has found that the Project to "Develop and Demonstrate a Model Procedure for Developing and Administering Competency Exams in Occupational/Technical Programs" has met the grant objectives in the Requests for Projects issued by the Texas Higher Education Coordinating Board.

Sara Mills Barnett, Ph.D.
Third Party Evaluator
June 26, 1993

33110005
TX

Development And Administering

Occupational Competency Exams

COMPETENCY EXAMINATION #10

USING AUTOCAD DIMENSIONING CAPABILITIES

PERFORMANCE EXAM:

Instructions to Student: Enter the drawing editor and copy the file PERT10 from the diskette to your user file or directory. You are to assume a plot scale of 1/2" = 1' for this drawing. The units for the drawing are architectural.

TASK 1 Set the units to display the fractions to the nearest one-fourth (1/4") inch.

TASK 2 The dimension text is to be displayed above the dimension line. (Hint this requires dim var settings).

TASK 3 The dimension text is to be one-eighth (1/8") inch and in a complex text font.

TASK 4 The dimension arrow size will be set for five-sixteenths (5/16") inch.

A Model

Development and Administering Occupational Competency Exams- A Model

Prepared By

Bill E. Lovelace, David Ingram
and Victoria Oglesby

Paris Junior College

For

The Texas Higher Education Coordinating Board
Community and Technical Colleges Division

In Cooperation With

Paris Junior College
June, 1993

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Contractor:	Paris Junior College Paris, Texas
Project Staff:	Vicki Oglesby, Project Administrator David Ingram, Principal Investigator
Disclaimer:	This publication was prepared pursuant to a contract with the Texas Higher Education Coordinating Board. Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgement in professional and technical matters. Points of view or opinions of the contractors, therefore, do not necessarily represent official position or policy of Texas Higher Education Coordinating Board.

ACKNOWLEDGEMENTS

The project involved the participation of a number of individuals to whom the project staff is very grateful. The success of the project would not have been possible without the input and expertise provided the advisory committee. Special credit and gratitude is extended to the members of the project advisory committee.

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Texas Council of Vocational Education
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Dr. Barry Russell, Director
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Temple Junior College
Temple, Texas

A very important "thank you" is extended to the program consultants who devoted many evenings and weekends developing the occupational exams in their program area. Consultants who contributed to the project results are as follows:

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A special "thank you" to Ms. Mary Carolyn Chambers, project secretary, for her work and efforts in compiling all the information.

I.

INTRODUCTION

The development and maintenance of a quality workforce is imperative if the United States is to be competitive in a global economy. The responsibility for preparing and maintaining a competitive workforce requires a partnership between our educational system and business/industry.

The purpose of P.L. 101-392, THE CARL D. PERKINS VOCATIONAL AND APPLIED TECHNOLOGY EDUCATION ACT AMENDMENTS OF 1990, IS:

> To make the United States more competitive in the world economy by developing more fully the academic and occupational skills of all segments of the population.

The act also states:

> The purpose will be achieved principally through concentrating resources on improving educational programs leading to academic and occupational skill competencies needed to work in a technologically advanced society.

Perkins II (P.L. 101-392) The Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990, requires accountability of recipients of Perkins II funds. Each state administering Perkins II funds is required to develop and implement a statewide system of core standards and measures of performance for secondary and postsecondary vocational/technical education programs. The statewide system of core standards and measures of performance must include *measures of learning and attainment of academic and occupational competencies.*

In the revised definition of *coherent sequence of courses* of 34 CFR[1], it is stated: "The Secretary believes that congress clearly intended that competency-based vocational programs be funded under the Act...." Based on these two requirements of Perkins II for accountability in terms of performance and competency-based programs, it is evident that performance measures and standards must relate to and be based on the occupational competencies of the workplace.

It is apparent that Perkins II requires the curriculum and instructional content of vocational/technical preparation programs be based on the competencies of the workplace. When the curricula and instructional content of a program are developed from the competencies of the workplace, the curricula are referred to as *competency-based curricula*.

The use of a competency-based curricula and the delivery of the curricula is supported by both mandate and implied mandate. The Technical and Vocational Program Guidelines - 1989 of the Texas Higher Education Coordinating Board (CB) advocate the use of competency-based curricula and instruction. The Guidelines provide the following definition:

> Competency-based education is designed to teach job related clusters of skills and knowledge, the mastery of which forms the basis upon which the student is evaluated; competency-based programs must possess the following characteristics:
>
> 1. Involvement of business and industry in the determination of the job competencies and the expected performance level required for successful employment within a defined job or cluster of jobs.
>
> 2. Course sequence which allows the mastery of competencies leading to the satisfactory performance of all identified competencies.

The above definition clearly directs that the curriculum and instructional content of postsecondary occupational preparation programs shall be competency-based.

Competency-based instruction in technical and vocational education has been described as an instructional delivery system that provides a process by which students develop measurable performance competencies, specified by business and industry, that will assist students in obtaining gainful employment based on their ability to perform in a productive manner.

Student attainment of occupational competencies is measured by *demonstration* of mastery of competencies using a variety of methods rather than *performance* only on written tests and subsequent comparison to the performance of other students. Students are held accountable for mastery of each competency and may progress at their own rate.

A review of final reports of program improvement projects funded by the CB reveals progress has been made in developing competency-based curricula that adhere to the two characteristics of Competency-Based Instruction specified in the CB definition of competency-based education above. Other characteristics of competency-based instruction include:

- **Performance objectives are developed for the program.** There is one performance objective developed for each task/competency. In addition, enabling objectives are sometimes developed for each performance objective.
- **The student is informed of the required competencies prior to instruction.** The specific requirements and content of the program, course, and performance objectives are provided to the student prior to instruction.
- **Student achievement is based on demonstration of mastery of specified competencies.**
- **Criterion-referenced testing procedures are used to evaluate student progress and performance.**
- **Student competency profiles are maintained for purposes of program articulation, student application for employment, and permanent records.**
- **Learning time is flexible.**

- **Learning is guided by feedback.**

With business and industry demanding that entry-level employees be competent occupationally, the national concern for educational accountability, and the need to serve special populations without "diluting" the curriculum, the concept of competency-based instruction is receiving considerable attention again. As we have seen with the use of buzzwords in other innovations and concepts, it has been popular to talk about competency-based instruction with enthusiasm even if it has not been well understood. Postsecondary technical and vocational education personnel in Texas are moving away from the conversational use of the concept and are in the process of moving toward a phase of design, actualization, and implementation of a competency-based instruction system.

In the report, STATE ASSESSMENT, for Section 116 of Perkins II, prepared by the Texas Higher Education Coordinating Board, (there were two recommendations that imply the use of competency-based instruction in the achievement of the two recommendations). The two recommendations made for *Criteria Factor II: Sequential courses of study leading to both academic and occupational competencies* are:

3. Public community colleges and technical institutes should develop a periodic review process to ensure that applied basic work skills are incorporated into the curriculum of each technical program.

4. Public community colleges and technical institutes should develop a periodic assessment to ensure that competency-based instruction is incorporated in all programs.

The achievement of recommendation "4" stated above will require the development of a model for developing and administering competency exams that can be used by individual institutions for the periodic assessment of competency-based instruction.

Accountability of vocational education and job training is also a concern of the Employment and Training Administration of the U.S. Department of Labor. Accountability of job training programs has been an emphasis of training programs conducted under the provisions of the Joint Training Partnership Act for years. On March 18, 1992, the Employment and Training Administration and the offices of Vocational and Adult Education jointly issued a notice of public meetings and a request for comments related to occupational skill standards. As a result of these public meetings, the U.S. Department of Labor and the U. S. Department of Education are cooperatively and independently funding national projects, by research and development activities to propose national standards for occupational competencies in industries and trades (Appendix G). An occupational skill standard or a *job-related skill standard* has been generally defined as the knowledge, skill, and level of ability needed to satisfactorily perform a given job or occupational competency.

In Texas, Governor Ann Richards has charged the Texas Department of Commerce to establish a Texas Skills Development Program. The purpose of the Texas Skills Development Program is to establish a *statewide method to make sure Texas workers have the skills business and industry need to market Texas goods and services in a global economy.* The Texas Skills Development program which was implemented in July of 1992 will ultimately identify skills of the workplace and the standards of the skills for skill certification requirements in Texas. It is anticipated that the Texas Skills Development Corporation will provide a mechanism for business, industry and labor to participate in the development and implementation of state-of-the-art competency curricula for secondary and postsecondary vocational/technical programs.

The accountability for Perkins II funds used to provide for occupational preparation of students is highlighted by the requirements for a state system of core standards and measures of performance for vocational/technical education programs. All of the states have developed a system of core standards and measures as required by Perkins II. However, it has been found that few of the states have specifically complied with the act in terms of the requirements of 34 CFR, 403.202, which states:

> (a) The statewide system of core standards and measures of performance for vocational education programs must include-
>
> (1) Measures of learning and competency gains, including student progress in the achievement of basic and more advanced academic skills...

Based on the previous citations, the Act mandates and implies that occupational preparation (vocational) instruction be *competency-based* and be delivered using *competency-based applied learning.*

The use of a *competency-based instruction system* has been found to be the best vehicle by which to deliver *competency-based applied learning.* The use of a competency-based instruction (CBI) system provides for measuring both student learning (progress) and competency attainment (proficiency).

In the PERFORMANCE MEASURES AND CORE STANDARDS FOR POST SECONDARY TECHNICAL EDUCATION PROGRAMS (CB, 1992), it is stated: "A measure is a description of an outcome, and a core standard is a desired level or rate of an outcome." These definitions are the same, with the exception of the word "desired," as the definitions provided in 34 CFR.

The use of the word "outcome" in the definitions of "measure" and "standard" for Perkins II adds confusion to the definitions since the word "outcome" has not been

defined and "competency attainment" has been given as an example of a core performance measure in section 115.(b)(2) of P.L. 101-392. A dictionary review reveals that Webster has defined "outcome" as "something that follows as a result or consequence." The word "consequence" was defined as "something produced by a cause or necessarily following from a set of conditions."

An educational dictionary defined "outcome" as "change in behavior resulting from learning; not to be confused with *objective*, which is a desired result." After a review of the definition of standards, measures, outcomes, and an example of a measure provided by Perkins II, it is concluded that a measure or a description of an outcome must be written in terms of specific performances expected of a student or program under prescribed conditions. Therefore, core measures, which are descriptions of outcomes, must be written in performance terms of what is expected of: (1) the student in relation to learning progress and competency attainment and (2) the program in relation to program objectives and goals.

As used in this model, attainment or mastery of an *occupational competency* using criteria of the workplace is considered a core measure of an expected student outcome. The "learning progress" could be another core measure description of an expected or established student outcome. In order to determine if the established student outcomes have been attained, it will be necessary to test or assess the student(s).

When a competency-based instruction (CBI) system is used to deliver the content of a competency-based curriculum, constant feedback from and to students concerning their individual learning progress is required. Therefore, students must be evaluated frequently to determine understanding of knowledge and performance of related tasks. In the test ITEM BANKING MANUAL, Dr. John Carnes[2] stated:

> On the surface, student testing measures knowledge and skills. In addition, it provides important feedback concerning program accountability. Because test items are easily keyed to job tasks, student evaluation shows which areas of instruction are effective and where improvement is possible.
>
> Frequent and immediate feedback to students concerning their progress reinforces good instruction. Item Banking (18) allows rapid generation of student evaluation instruments customized to student progress.

Test Item Banks are a very good tool for use in identifying and documenting student progress in learning of both academic and occupational skills. Test Item Banks will assist in achieving the Perkins requirement for measures of student learning or progress. Assessing and documenting student attainment of occupational competencies cannot be sufficiently achieved only by the use of test items. Competency exams also must be used to assess the attainment or mastery of an occupational competency by a student.

The above cited mandates and actions serve as notice to vocational/technical educators that they must immediately begin to assess and document vocational/technical students' occupational skill proficiency or occupational competency using occupational competency exams.

II.

OCCUPATIONAL COMPETENCY TESTING

The level of skill proficiency or occupational competence of the workforce will be one of the keystones upon which economic competitiveness in the world will be built. This premise recognizes that the prospective worker must possess personal qualities, occupational preparation, and other qualifications as reported by the Secretary's Commission on Achieving Necessary Skills (SCANS).

A great number of states require vocational/technical instruction to be "competency-based." However, a review of the literature did not reveal that any state requires the use of performance (competency) exams to assess and document the mastery of occupational competencies by vocational/technical students.

The search of the literature has revealed a limited amount of published information on occupational competency testing. An ERIC search produced only thirteen documents under the descriptor "occupational competency tests" and "occupational competency exams" for the years of 1966 to 1992. Current literature on testing in vocational education contains a wealth of information on Criteria Referenced Testing, Performance Testing, and Test Item Banking. However, these efforts relate primarily to written tests of occupational knowledge and procedures of performance.

One of the most complete studies of occupational competency testing was made by Panitz and Olivio in their study, *The State of the Art of Occupational Competency Testing* in 1970[3]. In their conclusions it was reported:

The State of the Art study provided crystal clear evidence...

A. That not a single professional testing agency, governmental organization, educational body, labor or management group was satisfied with either the qualitative or quantitative aspects of occupational competency testing;

B. That an exceedingly limited amount of data or experiences relating to occupational competency test development, administration, validation, or research results are recorded; ...

L. That there is a serious lack of data and research activity in occupational competency testing; ....

The findings from *The State of the Art of Occupational Competency Testing* and other efforts resulted in the creation and maintenance of the National Occupational Competency Testing Institute (NOCTI). NOCTI is now recognized for its work in developing and supervising the administration of occupational exams that provide tradesmen the opportunity to demonstrate the knowledge and skills they have acquired on the job. Primarily, these examinations are given to vocational teachers or prospective vocational teachers to determine the amount of college credit that a teacher education institution may award an individual for work experience.

One of the documents referenced in the study by Panitz and Olivio was OCCUPATIONAL COMPETENCY TEST - PROCEDURES AND INSTRUCTIONS FOR CONSTRUCTION OR REVISION, developed and published by the Ohio State Department of Education in 1962.[4] This document emphasized the importance of using the results of an occupational analysis to determine the skills and technical knowledge needed by a worker in the specific occupation for which the occupational competency test(s) are being prepared. The Ohio document highlighted the need for using the results of occupational analysis in test development in the statement:

> The manipulative processes to be tested should be selected carefully so that enough basic skills will be required to show mastery of the occupation.

During the period of 1979-1982, the American Institute for Research[5], under contract with the Office of Vocational and Adult Education, U.S. Department of Education, developed a series of instructional modules for the purpose of providing a national model for vocational competency test development. The Vocational Competency Measures (VCM) project developed and made available for dissemination twenty instructional modules designed to assist individuals in the development of competency tests.

All of the three references cited above (NOCTI, Ohio document, and VCM modules) describe the development and use of written (cognitive) and performance exams. The most common form of testing is the use of cognitive tests. It is advocated that cognitive testing can assess whether a student (or worker) knows how to do a task or competency. It is also felt by proponents of cognitive tests that they are the only way by which an assessment can be made of communication skills, computational skills, and occupational theory. Most educators feel that cognitive tests are the most useful and practical means to assess occupational or job knowledge.

Performance tests have been used in occupational (vocational) preparation programs to assess a student's psychomotor activities that are expected to be performed in the workplace. In the past, performance tests have been structured in the form of a simulation of a work situation. The performance tests or exams have normally been used for assessing performance in terms of process and products. Assessing performance based on the products produced is often the easier of the assessments because the examiner evaluates the results of the work performed. Products can be evaluated or measured against specific criteria or standards. An assessment of process involves the

observation and evaluation of behaviors and activities performed while a service is being provided.

The procedures for developing and administering occupational competency exams (tests) have been field tested and validated. The development and administration procedures used for assessing occupational competencies found in the review of the literature use a common process regardless of the examples given by the researchers and developers. However, none of the literature reviewed proposes that the knowledge or theory of the occupation can be assessed by a performance exam. To conclude that occupational knowledge must be assessed using a written (cognitive) test is contradictory to the process used in the workplace to assess an employee's performance in relation to job maintenance, promotion, or salary increases. There is an increased emphasis for students in occupational preparation programs to have demonstrated proficiency or mastery of occupational competencies of the workplace. Demonstration of occupational competencies can be made by the process of competency assessment by measuring performance with a set of standards or criteria established for the occupation by the workplace. The standards or criteria must be established as core for the occupation and not specifically for any individual employer, company, or corporation.

In reviewing the literature on occupational competency exams (tests) it was found that similar to other publications and papers related to competency-based education, competency-based curricula, and competency-based instruction, no one had defined the term "occupational competency." Researching and developing anything related to occupational competency without defining the term "occupational competency" is similar to teaching a class and not informing students of what they will be able to do after the instruction has been completed.

Based on the previous narrative, it is evident that there has been beneficial research and development activities related to the construction and administration of competency exams. It is also evident that previous work in the area of occupational competency exams have been done without a definition of occupational competency.

III.

DEVELOPING OCCUPATIONAL COMPETENCY EXAMS

Traditionally vocational/technical education programs have been evaluated using follow-up data such as; the number of completers employed, pursuing additional education or serving within the military within one year of graduation, satisfaction of student with instruction and/or employment, satisfaction of employer with completer, and wages of completers. How can we disagree with such "bottom-line" measures of performance? What could be wrong with a "core" measure or standard as employment, completing a degree, or pursuing additional education? For one thing, this presumes that evaluation or accountability should emphasize only post-activity or program completer results based on follow-up studies. The SCANS report WHAT WORK REQUIRES OF SCHOOLS and other publications have reported employers are not satisfied with the level of knowledge and skills of new employees that are needed to satisfactorily perform a given job.

The desired outcomes of **Texas Work Force Planning** in Texas include:

- Significant numbers of highly skilled workers trained for jobs in demand in each region.
- Prominent involvement by business/industry to determine priorities for vocational/technical programs and related skills.
- Increased efficiency and cost effectiveness of matching and delivering training for jobs in demand.

It appears that business and industry, the consumer of the products of vocational/technical education, are more concerned with the documentation of occupational proficiencies (competencies) which employees must have than data obtained

from traditional follow-up studies or reports completers of vocational/technical education programs.

Perkins II (P.L. 101-392) requires annual evaluation to determine the effectiveness of vocational/technical education (occupational preparation) programs in achieving the purpose of the Act which is: "to make the United States more competitive in the world economy by developing more fully the academic and occupational skills of all segments of the population."

Perkins II requires that the progress of both individuals and programs be evaluated annually. The term "progress" implies that the evaluation shall be continuous for periods during each year. Therefore, the standards and measures used in evaluation at the local institution must determine and document student progress during instruction. The evaluation criteria must use standards and measures that provide for progress evaluation as well as product evaluation.

Perkins II mandates process evaluation by requiring that the system of core measures and standards include measures of occupational and academic competency gains and attainment. Based on the review of the literature it is concluded that competency exams are the most accurate and effective measures of occupational competencies.

A graphic description of the model for developing and administering occupational competency exams is presented in Figure 1 on the next page. The narrative description of the model is provided in the following text.

Select Occupations

Few two-year vocational/technical programs are developed and delivered for only one specific occupation. A review of the Classification of Instructional Programs

CONCEPTUAL MODEL FOR DEVELOPING AND ADMINISTERING OCCUPATIONAL COMPETENCY EXAMS

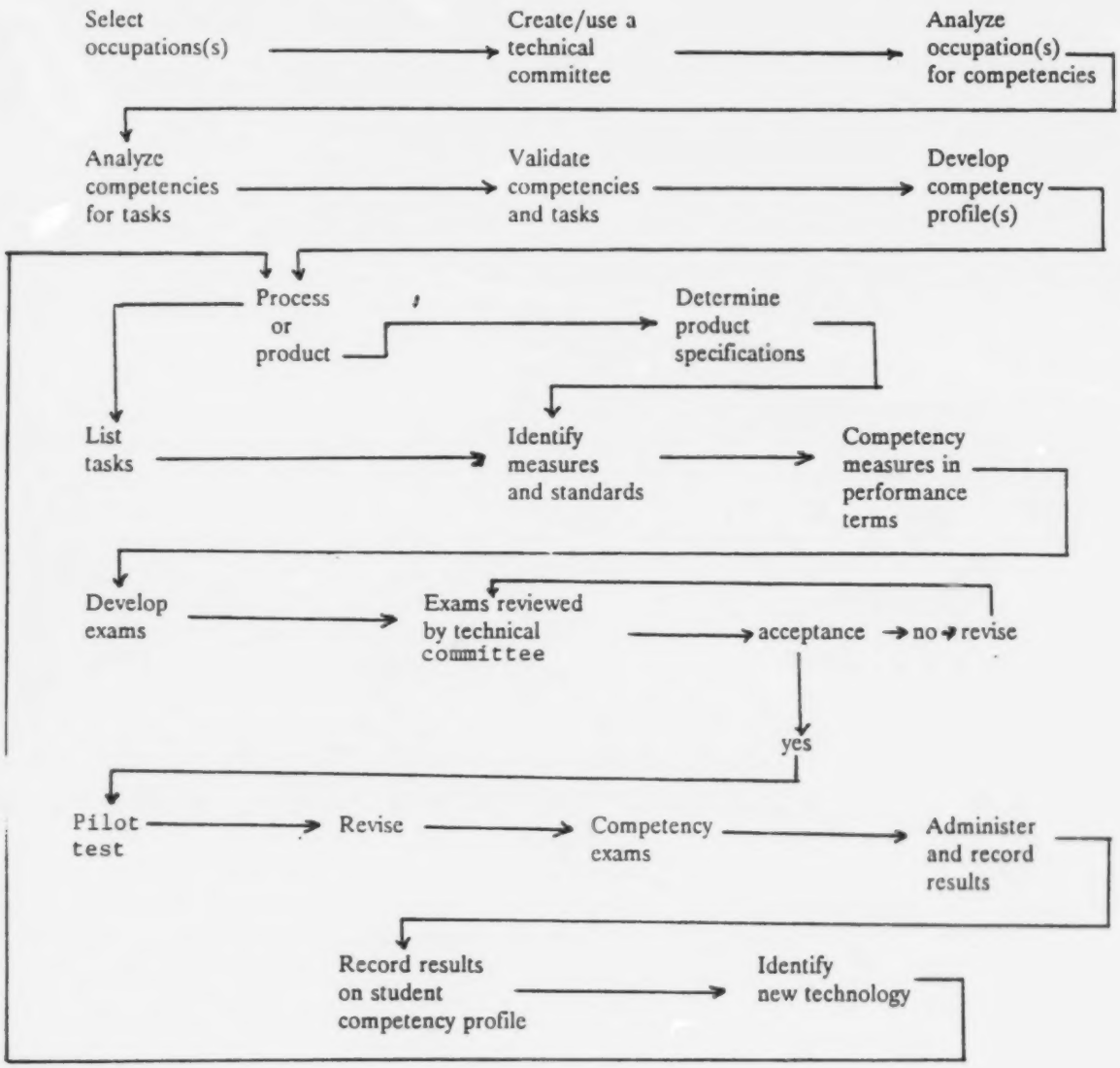


Figure 1

revealed that a cluster of related occupations are included in a vocational/technical program. Therefore, in the development or construction of occupational competency exams, the first thing that must be done is to identify the specific occupation(s) in the program for which the exams are to be constructed. Since the occupations are related and are clustered into a program such as Drafting Technology it may be most efficient to first develop competency exams that are "core" to all of the occupations in the program.

Core program occupational competencies are those competencies that are common across the occupations that have been clustered for the program. The core program competencies must be identified by a comparison of the occupational competencies of each occupation addressed by the vocational/technical/ program.

Technical committee

Most vocational/technical programs are conducted with the assistance of a Program Advisory Committee (PAC). The PAC is normally used in the initial development of the program curriculum, public relations for the program, and maintenance of the curriculum. In most cases the program advisory committee represents the occupations of the program for the geographic area served by the program. Since the curriculum of the program provides for occupational preparations in a cluster of occupations, it will be necessary to establish a technical advisory committee for each of the clustered occupations for which competency exams are to be constructed.

A technical occupational exam committee should be used for each of the occupations in a vocational/technical program. The technical occupational exam committee membership should be composed of representatives of: (1) employers, including supervisors of the occupation; (2) trade or professional organizations of the occupation; and (3) organized labor, if appropriate.

The technical occupational committee should assist in the construction and administration of the occupational competency exams by:

- Assisting in identifying and validating the competencies of the occupation.
- Assisting in identification and validation of the competencies of the occupational tasks.
- Establishing the entry level criteria or standards for determining mastery of the occupational competencies.
  - In terms of competencies that result in a product, the product, the product specifications, and time for completion of the product would be established.
  - In terms of competencies that result in a service or repair, the specifications for service provided or repair completed and the time for completion of the service or repair.
- Assisting in the administration of the competency exams.

If it is anticipated that the competency exams that are developed will be used statewide, it is recommended that the geographic representation of the technical committee be statewide. When selecting or recruiting members for the technical committee it must be emphasized that the member is representing the occupation and not a specific firm, company, or corporation.

Identifying Occupational Competencies

The procedures for identifying the true competencies of an occupation have become confusing due to the lack of a definition of the term "occupational competency". Also, far too many individuals are developing instructional content for occupational

preparation programs without benefit of educational preparation and experience in occupational analysis and occupational curriculum development.

In recent years, the educator "experts," in writing and talking about competency-based education have either avoided defining the term "competency" or have described it in educational terms without consideration of its use in the workplace. The term "occupational competency" is presently being used synonymously with the terms "tasks," "duties," and "functions." The term "competency" has been used synonymously with the term "task" more than with any other term.

The instructional content for an occupational preparation program must be developed based on the requirements (competencies) of the workplace. An occupational analysis or job analysis must be performed in order to identify the occupational or performance requirements of the occupation. To understand the requirements of an occupation one must know the meanings of certain terms used in designating the requirements. Several important terms, primarily jobs, operations, duties, tasks, and theory, should be understood before making an occupational analysis for developing instructional content and developing occupational competency exams.

During the instructional process and the monitoring of student progress, the use of the term "competency" may not be significant to the student or instructor. Yet, it is accepted and, at some educational levels and in some states, it is mandated that a competency profile be maintained for each student participating in an occupational preparation program. If "competency" and "task" were defined as being the same, there could be as many as two hundred or more competency statements on a competency profile. If the competency profile is to be used as part of a student's permanent record, a part of the transcript, and/or a document to verify a student's occupational

competencies for a potential employer, a competency profile, with fifty or more statements, would not be useable. The bulk of the profile would make it inappropriate for the permanent record, as an attachment to the transcript. Also, it would be too detailed and confusing to the potential employer. Therefore, it becomes evident that if competency profiles are to be developed and used with the transcript and by the employer, the term "competency" cannot be equated with the term "task".

Charles R. Allen[6] believed the work that an individual does and is paid for is called his/her job. The use of the term "job" in reference to what people get paid to do makes it a performance term. Selvidge[7] referred to a job as a piece of work done, a completed project, or a service provided. Fryklund[8] defined operation as a unit of work that can be compared to an operation in arithmetic. Since it takes several operations to solve a problem in algebra, it also takes several operations or tasks, in sequence, to produce or repair something, or provide a service to someone.

The interpretation of the term "job" by Selvidge is very similar to one of the definitions of "job" provided by Webster's Dictionary. Webster's Dictionary also refers to "job" as a specific duty, role, or function. Weber[9], in advocating competency-based teacher education, recommended using the roles of teachers in the identification of teaching competency statements. (The instructional content would then be identified by an analysis of the competency statements.)

For the purpose of occupational analysis, the term "job" as used by Selvidge and the terms "specific duty," "role," or "function" may also be equated to the term "competency" as used by Weber. Therefore, as used here, the "competency" will be used synonymously with the terms "duty", "role", "function", and "job". The term "occupational competency" is used in this model to mean *work performed that results in a*

service being provided, products produced, or repair made by an individual in an identifiable occupation in the workplace. The requirements of the workplace are interpreted to mean the products, services, or repairs required to be produced, provided, or performed by an employee.

As used here, the term "curriculum" means a systematic group of courses or sequence of subjects required for certification, licensure, or entry-level employment in a specific occupation or cluster of related occupations. It has been well documented by researchers of vocational and technical education and by developers of military training materials that curricula for occupational preparation must be based on the occupational requirements of the workplace. In years past, the instructor of an occupational program was required to develop curricula and courses of study to meet the training needs of the workplace. During those years, instructors of occupational preparation programs developed the instructional content of a training program using the process of occupational analysis. Today, vocational instructional materials specialists may rely on the expertise of public and private curriculum centers to provide them with a list of job (and task inventories) which have been developed by occupational analysis. Occupational analysis is a long drawn-out process and must be performed by an individual trained in the science of analyzing occupations for training content.

Another procedure which is used to identify occupational competencies or job requirements of the workplace is a process known as **DACUM**. "Developing **A** **C**urriculum" has emerged as an innovative and relatively new approach to occupational analysis. **DACUM** has been used successfully to analyze occupations for identifying the occupational requirements of the workplace. The **DACUM** committee, whose members are incumbent workers or supervisors of those workers for the occupation(s) being

analyzed, will identify the specific competencies, jobs, or duties performed by entry-level workers. The process can also identify the tasks of each competency identified. The **DACUM** process, using a group of eight to twelve expert workers, takes about three days to identify the performance requirements of the occupation. If **DACUM** is to be successful, the committee members must work under the guidance of a trained and experienced **DACUM** facilitator. Northeast Texas Community College has developed a resource manual and training program for developing a competency-based curriculum. The manual, **TEXCOM**, a Texas System for Developing a Competency-Based Curriculum, is a Texas adaptation of **DACUM**.

Another process that may be used locally which provides input from a greater number of expert workers is referred to as a local validation of previously identified competencies or tasks which are available as "job or task inventories" for a specific occupation. Local planners of vocational and technical programs can obtain the task inventories from public, private, and military curriculum centers. Competency lists or requirements may also be obtained from state and national licensing or accreditation agencies or organizations. These lists of competencies and tasks can be validated, with the assistance of the technical committee, by surveying incumbent workers of the occupation for which instruction is being developed or updated. An example of a survey form which may be used to validate competencies (duty or duty areas) and tasks is presented in Appendix B.

Practically every occupation can be divided into divisions of work. Usually occupations will be divided into divisions by the kinds or types of: (1) materials used; (2) products produced; (3) services provided; (4) repairs performed; or (5) equipment used. The primary purpose of dividing the occupation into divisions or duty areas is to identify

the worker requirements or competencies and for the designation of training areas. Occupational analysts of the armed forces often use the term "duty area" instead of occupational division.

A graphic description of occupational analysis is shown on the following pages. Figure 2 shows the relationships of an occupation to the occupational division and competencies.

Figure 3 shows the relationship of an occupation to division, competencies, tasks, and steps. A step is the smallest manipulative activity into which a task can be divided.

Figure 4 provides an example of the relationships shown in Figure 3 for the licensed vocational nurse.

The graphic arrangement of the occupational divisions, competencies, and tasks will make it easier to structure the curriculum by courses.

The occupational analysis procedure involves the following activities which are listed in sequence:

1. Select the occupation for which the instructional program is to be developed;
2. Divide the occupation into divisions, blocks, or duty areas;
3. Identify the competencies of each duty area;
4. Identify all the tasks for each competency;
5. Arrange the tasks and competencies in sequential order; and
6. Analyze each task for instructional content.

When the occupational analysis has been completed, all the data will be available to develop the curriculum, the competency profile, the basic course outlines for the occupational preparation program, and the occupational competency exams.

RELATIONSHIP OF OCCUPATION TO DIVISIONS AND COMPETENCIES

Occupation
(Position of Employment)

Occupational Division 1 (Duty Area)	Occupational Division 2 (Duty Area)	Occupational Division 3 (Duty Area)	Occupational Division 4 (Duty Area)
Competencies	Competencies	Competencies	Competencies
1.	1.	1.	1.
2.	2.	2.	etc.
3.	3.	3.	
4.	4.	4.	
etc.	etc.	5.	
		6.	
		etc.	

Figure 2

RELATIONSHIP OF OCCUPATIONAL DIVISION FOR COMPETENCIES, TASKS AND STEPS

Occupation
(Position of Employment)

Occupational
Division 1
(Area/Duty)

Competency 1	Competency 2	Competency 3	Competency 4	Competency 5 etc.
Tasks 1. 2. etc.	Tasks 1. 2. etc.	Tasks 1. 2. etc.	Tasks 1. 2. etc.	Tasks 1. 2. etc.
Steps of each Task	Steps of each Task	Steps of each Task	Steps of each Task	Steps of each Task

Figure 3

EXAMPLE OF THE RELATIONSHIPS OF OCCUPATION, OCCUPATIONAL DIVISION, COMPETENCIES, TASKS AND STEPS

(Occupation) Licensed, Vocational Nurse

(Division) Care for Obstetric and New Born Patients

(Competencies)

1. Care for prenatal patients	2. Care for patients during labor and delivery	3. Care for post-partum patients	4. Provide immediate post delivery care of infants	5. Provide care for newborn	6. Assist with feeding
Task 1	Task 2	Tasks etc.			
Step 1. Step 2. etc.	Step 1. etc.	Steps			

Figure 4

Competency Profiles

Reference has previously been made to "competency profile." Some states have mandated that competency profiles be maintained for each student participating in an occupational preparation program. In Texas, a rule of the Texas State Board of Education states: "A competency profile shall be maintained on each student enrolled. Competency profiles for students in vocational education courses, other than grades 11 and 12 occupational specific courses, shall be defined as evidence of the essential elements."

A review of the literature reveals that there are a variety of models and formats of competency profiles. Through close examination of the competency formats or models it was determined that the purpose or use of the profile and the users definition of the term "competency" governed the format and content of the profile.

A competency profile should be maintained for each student participating in an occupational preparation program. One definition of a profile given in Webster's New Collegiate Dictionary is: "a graph representing the extent to which an individual exhibits traits or abilities as determined by tests or ratings." This definition could be restated to define a competency profile as graphic presentation of the extent to which a student demonstrates the competencies of an occupation as determined by competency exams. The competency profile should be used to graphically present the competencies mastered in an occupational preparation program by an individual student. The competency profile should not be designed to display student progress. It must be designed to display a record of competency achievement or mastery.

In addition to serving as a record of occupational competency attainment the institution where the student is pursuing occupational preparation, the competency

profile should serve the potential employer with a documented list of competencies mastered by the student. The competency profile of an individual student in essence serves as documentation of *skills* certification. In addition to serving as a permanent record at the institution and as a record of competency achievement or mastery for potential employers, the competency profile will become an essential record for four-year articulated occupational curricula used in Tech-Prep programs and 2+2 programs articulated between secondary and postsecondary institutions.

As previously mentioned, there are a variety of purposes and formats of competency profiles. If the competency profile is to serve as a graphic record of the competencies of an occupation mastered by a student it should include, as a minimum, the following items:

1. Name of institution;
2. The name of the curriculum or program;
3. The name of the occupation(s) for which the student is preparing to enter;
4. The name of the student;
5. Social security number of the student;
6. A list of all the competencies of the occupation(s) to be mastered; (it would be beneficial if each competency was numbered)
7. A space to enter the date the competency was mastered;
8. Space for the name of the individual (examiner) who observed the demonstration of mastery of the competency; and
9. Name and signature of authorized institutional representative (Program-Division Director, Occupational Dean-Director, Instructor).

An example of a format for an occupational competency profile is presented in Figure 5.

Identify Performance Measures

At this point it is apparent that the procedures described here for the development of occupational competencies are the same procedures used in developing a competency-based curriculum. The next step in developing the curriculum and the instructional content for the curriculum is the procedure of *task analysis*. For those who are unable to make a distinction between occupational analysis and task analysis, it may be more appropriate to refer to task analysis as instructional analysis or analysis for instruction. A task analysis is conducted to identify the instructional content needed to prepare an individual to perform a task(s). Task analysis is referenced here because it may be needed in identifying performance measures of an occupational competency.

Identifying performance measures to assess achievement of an occupational competency may be the most difficult task in the development of competency exams. The measures must be selected and/or approved by practitioners of the occupation(s) for which the competency exams are being developed. However, it will be the responsibility of the exam developer to assist in the selection of the performance measures. The exam developer can provide guidance and assistance by developing guidelines and materials for selecting the measures.

The guidelines and materials provided to the members of the technical committee by the exam developer should include the following premise and procedures. Both process evaluation and product evaluation may be used in developing competency exams. Both occupational knowledge and skills can be evaluated by performance. All of the literature reviewed has emphasized that occupational-competency exams should mirror

Figure 5

EXAMPLE OF FORMAT FOR A COMPETENCY PROFILE

Name of Curriculum _____ **Name of Student** _____

Name of Occupations(s) _____ **Student I.D. #** _____

Comp. No.	Competency Statement	Date of Mastery	Name of Examiner	Comp. No.	Competency Statement	Date of Mastery	Name of Examiner

Signature of Secondary Instructor _____ **Signature of Postsecondary Instructor** _____

the workplace. Not only should the knowledge and skills assessed by the exam duplicate the conditions and requirements of the workplace, but also, the process of evaluating employee performance in the workplace should be replicated. Therefore, it is recommended that separate written tests (cognitive) not be used as part of competency examinations. It has been demonstrated by industry that the knowledge and academic skills required of the employee can be evaluated by observation of an employee's performance.

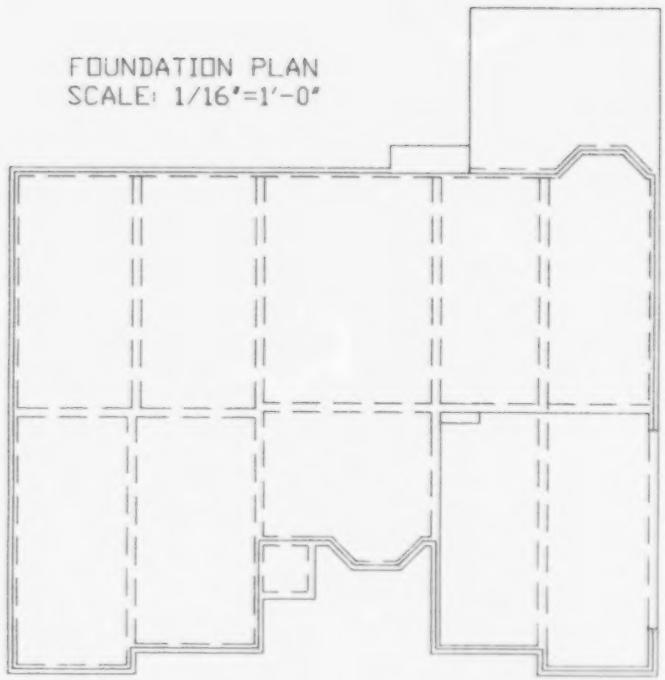
The observation of a workers performance of a competency can be done by process evaluation, product evaluation, or a combination of both. The measures of competency attainment for an occupational competency that results in a product can be identified easily using product evaluation. The measures or criterion for evaluating the competency would be based on the specifications (standards) for the product. If the student being examined can not produce the product to set specifications then the student has not mastered the competency. An example of the specifications of a product is presented in Figure 6.

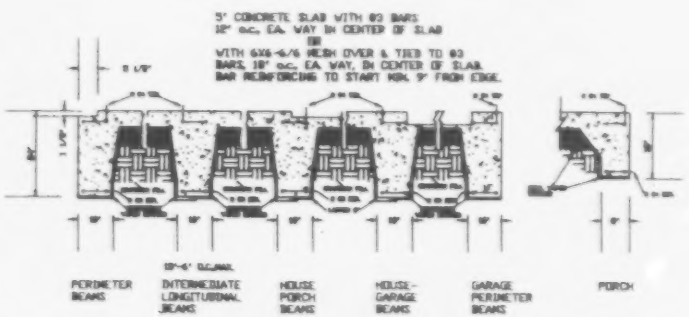
If the occupational competency results in a service being provided or a repair being made, then process evaluation should be used. Process evaluation will require measures or criteria for each task performed in the completion of the competency. Tasks can be written as performance measures or criteria for occupational competencies that result in a service or repair. When written in performance terms, tasks can be used as measures to evaluate occupational knowledge, required academic skills, and occupational skills. An example of tasks being used as performance measures of a competency is shown in Figure 7.

Figure 6

Sample Competency Sheet

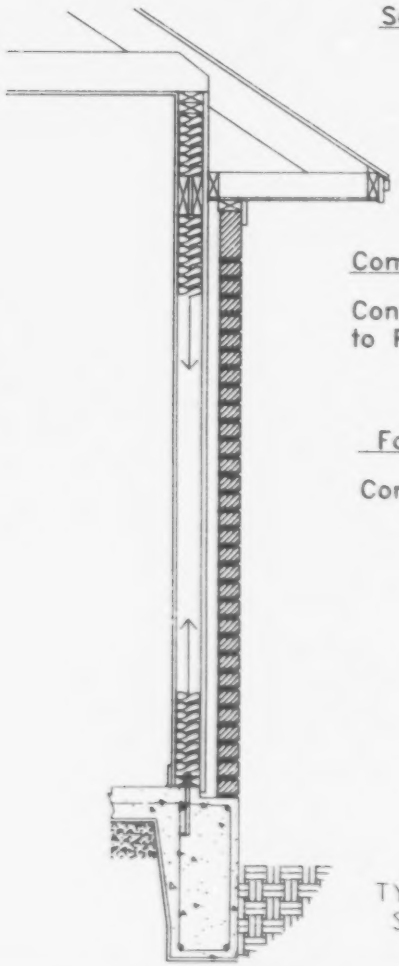
FOUNDATION PLAN
SCALE: 1/16"=1'-0"




5" CONCRETE SLAB WITH #3 BARS
12" o.c. EA. WAY IN CENTER OF SLAB
OR
WITH 6X6-6/6 MESH OVER & TIED TO #3
BARS, 18" o.c. EA. WAY, IN CENTER OF SLAB.
BAR REINFORCING TO START MIN. 9" FROM EDGE.
PERIMETER BEAMS
INTERMEDIATE LONGITUDINAL BEAMS
HOUSE PORCH BEAMS
HOUSE-GARAGE BEAMS
GARAGE PERIMETER BEAMS
PORCH

FOUND. DET.
SCALE: 1/4"=1'-0"

NOTES:
- BOTTOMS OF ALL BEAMS SHALL EXTEND 6" INTO UNDISTURBED SOIL.
- LAP ALL BAR STEEL 40 DIAMETERS.
- LAP ALL WIRE MESH 6".
- GARAGE & PORCH SLABS SHALL BE SAME AS HOUSE SLAB.
- FOR HOUSE LENGTHS MORE THAN 30' AND UP TO 60' IN LENGTH, PROVIDE: 3-5/8" RODS IN BOTTOM AND 2-5/8" RODS IN TOP OF ALL LONGITUDINAL BEAMS.



Competency

Converting Model Space to Paper Space

Facility/Equipment

Computer Assisted Design Lab

TYP. WALL SECTION
SCALE: 1/2"=1'-0"

PARIS JUNIOR COLLEGE DRAFTING TECHNOLOGY DEPARTMENT		
SCALE: AS NOTED		DR.BY:
DATE: 02/17/92		DR.NO: xxxx
TITLE: DETAIL SHEET		SHEET: 84
PROB:		

83

A SAMPLE

COMPETENCY EXAMINATION RATING SHEET

Competency: Printing a Program in a Structured Computer Language.

Performance Objective: The student will plan, code, debug, and print a program in a structured computer language, achieving 80% mastery on the performance exam.

STUDENT _____ Competency Mastered YES ____ NO ____

EXAMINER _____ Date of Rating _____

PERFORMANCE CRITERIA	STUDENT PERFORMANCE		
	Satisfactory	No. of Attempts	Completion Date
1. Loaded the program compiler.			
2. Designed a program solution by flowchart or psedocode.			
3. Coded the program.			
4. Debug the program.			
5. Tested the program with test cases.			
6. Documented the program.			

Comments:

Figure 7

Performance criteria can be generic as shown in Figure 8 if the instructions for the student and examiner are specifically written and include standards for the competency.

Writing Measures in Performance Terms

At the heart of the procedures for developing competency exams is the criterion-referenced measure (CRM). However, before moving into more detail of developing competency exams it may be of value to review the development of criterion-referenced measures. A criterion-referenced measure is a test item, or statement on how testing will be conducted. The purpose of the CRM is to test the performance objective of a competency or task and thus determine whether the student has met the required performance level (criterion/standard). It helps to think of the CRM as a means of testing what has been planned in the competency or task performance objective. In other words, the terminal performance objective (competency) is a plan for instruction with set conditions and standards, while the CRM is a vehicle for measuring the outcomes of the learning. Therefore, if a test item or test (measure) is based (referenced) on a standard (criterion) then it is a criterion-referenced measure, thus the term.

Criterion-referenced measures serve important functions in a competency-based vocational program, among these are the following:

1. Assists the teacher in planning and ensuring that the testing of a competency is based on the terminal performance objective.

2. Ensures that all competencies will be evaluated using the predetermined standard for each competency and task.

3. Integrates instruction and learning with testing and evaluation since both phases are based on a performance objective.

4. Ensures an accountability of the testing program, because the CRM is based on the performance objectives and instruction.

5. Assists the student in a better understanding of what is required for successful performance.

6. Communicates to the employer and advisory committee the evaluation procedures and standards.

7. Improves the organization and quality of the evaluation program.

8. Ensures that the total task or competency is measured, rather than just a portion, such as knowledge.

9. Yields constant results because a constant standard is used.

10. Reduces student test anxiety because evaluation is based on what the student has been previously informed.

When writing or selecting criterion-referenced measures for a vocational program or course, certain guidelines should be followed.

1. The criterion-referenced measure must require the same performance on the test as is stated in the competency or task performance objective. Consider the following example:

Performance Objective

Provided with a machine part, specifications, drafting tools, materials, and equipment, draw a two-view detail. The detail drawing must include no more than two views, be orthographically correct, and comply with ANSI drawing standards.

Criterion-Referenced Measure

Describe how to prepare a two-view detail drawing, according to ANSI drawing standards.

In the example, the performance objective required one type of performance (skill) and the CRM a different type (knowledge). Therefore the CRM is not acceptable. The CRM should read:

Draw a two-view detail drawing of a machine part. Your drawing must be orthographically correct and meet ANSI drawing standards.

2. The CRM must test all performance elements contained in the performance objective. In the previous example there is only one performance required:

"draw a two-view detail." However, if the performance elements reads: "draw and dimension a ....," then the CRM would read:

Draw and dimension a two-view detail drawing of a machine part. Your drawing must be orthographically correct and meet ANSI drawing standards.

3. The same standard or criterion must be used to evaluate the performance of the student. Suppose a performance objective stated:

Performance Objective

Given a two page rough draft and typewriting directions, type a final manuscript with all errors corrected at a production rate of 30 words per minute.

Criterion-Referenced Measure

Obtain a manuscript from the teacher and type it at 25 wpm with only one error.

The problem with this CRM is that the criterion/standard is not the same as the one for the performance objective.

4. The same terminology should be used in writing the CRM as is used in the performance objective. If the performance objective states TYPE A BUSINESS LETTER..... , then the CRM must use the work TYPE, not PREPARE, WRITE, or DEVELOP.

5. The CRM should require the same conditions to be met during the testing as were stated in the performance objective. For example, if an Accounting I teacher requires the students to use their memory in solving problems, then the CRM should require the same condition. If a student is required to extract information from a newspaper for demonstrating some competency, then the CRM should use a newspaper as a condition of the testing.

6. Although the criterion or standard is not required to be stated in the CRM, it is helpful sometimes to include the standard. By doing this, the student knows how and to what criterion the performance will be evaluated. Therefore, it is helpful to include both a description of how the testing is to be conducted, as well as the criterion for evaluation.

7. Do not include additional skills or knowledge in the CRM if they are not contained in the performance objective. The purpose of the CRM is to test the performance objective and not other skills and knowledge. If it is important to evaluate principles, minor skills, and knowledge, use additional tests to obtain this information. The following example illustrates this principle.

Performance Objective

Given 15 letters and documents for filing and filing directions, file all letters and documents alphabetically without error.

Criterion-Referenced Measure

Obtain materials to be filed from the instructor, file without error, and pass a written test on filing terminology.

The problem with this CRM is that an additional test or requirement has been added. The CRM should only test the performance required in the performance objective. The filing terminology is useful and probably will be demonstrated by the student. However, the terminology test should be given during the teaching-learning process to test student knowledge of certain enabling objectives.

If criterion-referenced measures cannot be selected from resource materials, then they must be written for each task and competency. Thus, the following steps should be used as a guide for writing CRM's.

1. Study the competency, task, and lesson objective to determine the type of performance or behavior required. Is it a skill, knowledge, attitude, value, or feeling?

2. Next identify the standard which is used to evaluate the student's performance. (For a competency this is the same standard that is used by employers to evaluate the work of an employee.)

3. Determine what condition, equipment, materials, etc. will be required to evaluate the student's performance.

4. Write the criterion-referenced measure.

5. Finally, review and evaluate the CRM by answering the following questions:

   a. Is the same performance tested by the CRM as identified in the performance objective?

   b. Does the evaluation standard used to measure student performance in the CRM agree with the performance objective standard?

   c. Are the same conditions (equipment, materials, environment) used for both the CRM and performance objectives?

   d. Is the terminology in the CRM and performance objective compatible?

c. Does the CRM test all skills, knowledge, and/or attitudes included in the performance objectives? There must be a performance exam and an examination procedure for each competency specified.

6. The final step is the testing of the CRM's in the program to determine whether the students understand the testing directions and whether the CRM really measures the performance stated in the performance objective.

Developing Competency Exams

Curriculum materials centers are developing test-item banks and performance exams. Competency exams are available from curriculum centers. The National Occupational Competency Testing Institute at Ferris State University in Big Rapids, Michigan has a variety of occupational competency exams for sale.

If the competency exams cannot be obtained from the curriculum materials centers, then they must be developed for each competency. In preparing the competency exams, the following steps should be observed:

1. Study the terminal performance objective which was written for the competency to determine specifically what performances are to be measured.

2. Next, identify the standards or criteria which are used to evaluate the performances. The selected standards should be approved by members of the program advisory committee.

3. Determine the environment, equipment, materials, etc. which will be required to perform the competency. Remember, a competency is equated to a product produced, repairs performed, or a service provided.

4. Develop a set of instructions to be observed by the student in taking the exam.

5. Identify the individual and qualifications of the individual who will be responsible for administering the exam and rating the performance of the student.

6. Write instructions and prepare rating sheets to be used by the examiner.

NOTE: In any articulated program (articulated curriculum) both secondary and post-secondary instructors should be involved in the selection of and/or the development of competency exams.

It is recommended that competency exams be administered and rated by a member of the program advisory committee, technical committee, or a person in the workplace responsible for the evaluation of employees under their supervision. A modification to this process of competency examination for tech prep or articulated technical/vocational programs is for postsecondary instructors (of the respective program) to administer and rate the competency exams for secondary level students and vice versa.

All requirements and processes for preparing criterion referenced tests must be observed in preparing competency exams. Instructors may assist students in preparing for competency exams by the use of competency sheets used in programs with a competency-based instructional system.

For an example of format and structure of a competency exam, look at samples of a performance exam as developed by the project consultants. (Refer to Appendices C, D, E, and F). These samples were developed after a through search of the literature had been conducted and input provided by the project advisory committee and the program consultants.

The background information and the procedures described in this model will assist you in developing and administering valid and useful occupational competency exams. As you continue to work with your technical committee in developing occupational competency exams your expertise will increase.

APPENDICES IV

APPENDIX A

DEFINITION OF TERMS

APPENDIX A

DEFINITION OF TERMS
ASSESSMENT OF COMPETENCY-BASED INSTRUCTION

Advisory Committee (occupational program): A group from Business and Industry (workplace) who advise on the establishment and ongoing operation of training programs.

Affective Domain: Attitude, emotion, values clarification and appreciation objectives are included in the affective domain.

Analysis, Occupational: An activity performed to identify occupational competencies and tasks necessary to perform a clearly defined, specific job (position) organized into a logical sequence which may be used for developing a competency-based curriculum, employment, or classification purposes. Syn. Job Analysis.

Analysis, Task: The process of identifying the steps and sequence of steps of the tasks and other instructional content such as theory, communication skills, computational skills, safety, equipment, and tools needed by the student to learn and perform the task.

Articulation: Is a planned process linking technical/vocational programs and services to assist students in making a smooth transition from secondary to postsecondary training/education without experiencing delays or duplication of learning.

Assessment: The process of measuring performance against a set of standards (through examination, practical tests, performance observation, and/or the completion of portfolios of work and assignments). (DOL, ED 1992) Syn. Competency Exam

Behavior: Behavior is performance--what the student does when he/she demonstrates satisfactory achievement of a specified objective or outcome. Is something that must be observable and measurable.

Career Ladder: The sequential vertical arrangement of occupations in which the occupation placed at any point on the ladder contains all of the occupational competencies of the occupations placed below that point. Students exiting a program at a career ladder point should be counted as a program completer of that occupation on the career ladder.

Certification: The provision of a certificate or award to individuals, indicating attainment of a skill, certain skills or knowledge, usually as a result of a competency-based assessment process. (DOL, ED 1992)

Cognitive Domain: Knowledge, thinking, understanding, and problem solving objectives are included in the cognitive domain.

Competency-Based Curriculum: A curriculum that is developed using the competencies of the occupation(s) from the workplace for determining instructional content and performance objectives of the courses of the curriculum.

Competency-Based Education: Is designed to teach job related clusters of skills and knowledge, the mastery of which forms the basis upon which the student is evaluated, competency-based programs must possess the following characteristics:

1. Involvement of business and industry in the determination of the competencies and the expected performance levels required for successful employment within a defined job or cluster of jobs.

2. Course sequence which allows the mastery of competencies leading to the satisfactory performance of all identified competencies. (Texas Higher Education Coordinating Board 1989).

Competency-Based Instruction: An instructional system designed to implement a competency-based curriculum with publicly stated expected outcomes; instruction is organized, delivered, and reported in a manner that maximizes learning of each individual student; and evaluates students on their achievement of occupational competencies. Syn. Competency-Based Instructional System.

Competency Exam, Occupational: A performance exam used to evaluate a student's mastery of a competency.

Competency Profile, Academic Subject: A student record that lists all of the academic competencies of the academic subject and provides a record of the date on which the student demonstrated mastery of each competency and the signature of the individual attesting to the demonstration of mastery of each competency. The profile should include the name(s) of the institution where instruction was provided and the mastery of competencies were demonstrated. The competency profile may include other information used as: course titles related to the competencies; name of the academic subject; other student achievements/characteristics; and names of instructors for each course listed.

Competency Profile, Occupational: A student record that lists all of the occupational competencies of the occupational preparation program and provides a record of the date on which the student demonstrated mastery of each competency and the signature of the individual attesting to the demonstration of mastery of each competency. The profile should include the name(s) of the institution where instruction was provided and the mastery of competencies were demonstrated. The competency profile may include other information such as: course titles related to the competencies; name of occupational preparation program; other student achievements/characteristics; and names of instructors for each course listed.

Condition: Conditions specify the limits within which the student is expected to perform. The work environment must be described. This includes a description of tools, equipment, clothing the student is to use; special job aids or manuals that will be provided; and environmental conditions which may affect the task to be performed.

Consequence: Something produced by a cause or necessarily following from a set of conditions.

Course: Organized subject matter in which instruction is offered within a given period of time, and for which credit toward graduation or certification is usually given.

Course of Study: (1) Strictly, an official guide prepared for use by administrators, supervisors, and teachers of a particular school or school system as an aid to teaching in a given subject or area of study for a given grade, combination of grades, or other designated class or instruction group; may include the aims of the course, the expected outcomes, and the scope and nature of the materials to be studied, with suggestions as to suitable instructional aides, textbooks, supplementary reading, activities, suggested learning experiences, teaching methods, and measurement of achievement; (2) sometimes loosely and incorrectly used as synonym for curriculum.

Criterion (plural-Criteria): The standard(s) required for a student to reach mastery of an objective.

Criterion-Referenced Evaluation: A testing (evaluation) technique that measures an individual's performance against a predetermined standard.

Criterion-Referenced Measure (CRM): A test, test item, or a statement which describes how a student will be tested and/or evaluated. The CRM is based on the task/competency standard or criterion, as illustrated in the following examples:

> Psychomotor - Tune an adjusted carburetor in accordance with the manufacturer's specifications with 45 minutes.
>
> Cognitive - Identify nine out ten technical terms used in masonry on a written test.
>
> Affective - Exhibit positive attitudes in the vocational classroom and laboratory. Your attitudes will be evaluated by the Program Attitude Checklist.

Criterion-Referenced Testing: A process of testing which yields measurements that are directly interpretable in terms of specified performance standards. An individual's performance is compared to a criterion, the criterion being the work of performance standard. Therefore, criterion-referenced testing is based on absolute standards stemming from the competency rather than relative standards such as class standing (also called criterion-reference evaluation, objective-referenced testing, proficiency testing, or domain-referenced testing).

Curriculum (plural-Curricula): (1) A systematic group of courses or sequences of subjects required for graduation or certification in a major field or study, for example, social studies curriculum, physical education curriculum; (2) a general overall plan of the content or specific materials of instruction that the school should offer the student by way of qualifying him for graduation or certification or for entrance into a professional or a vocational field; (3) a group of courses and planned experiences which a student has under the guidance of the school or college: may refer to what is intended, as planned courses and other activities or intended opportunities or experiences, or to what was actualized for the learner, as in actual educational treatment or all experiences of the learner under the direction of the school.

Duty: Used synonymously with occupational competency.

Element: The smallest step into which it is practicable to subdivide any work activity without analyzing separate motions, movements, and mental processes.

Entry-Level Skills: The set of competencies required of a beginning worker in an occupation for immediate productivity upon entering that occupation.

Exit Points, Career Ladder: Specified career ladder points in the sequence of courses for a technical or occupational program at which a student may exit the program, receive a certificate, and possess the competencies required for employment in an identified occupation on the career ladder.

Individualized Instruction: A method of instruction that takes the needs and learning styles of the individual student into consideration to determine his/her best learning method. Instruction is said to be individualized as long as instructional decisions are based on meeting the learning needs of the individual student.

Job Analysis: The analysis of a job to identify the competencies and tasks performed on a given job.

Job Description: A listing of the duties (occupational competencies) performed regularly in one's trade, occupation, or profession.

Knowledge Test: A test used to assess mastery of knowledge (cognitive) tasks including both written and oral testing.

LAP (Learning Activity Packages): The LAP system of instruction divides the course content into a series of individual learning packages which includes one or several competencies.

Levels of Occupational Competency: The assessed level of proficiency in the performance of an occupational competency; the lowest level of accepted performance of the competency under minimal or normal supervision. Another level of proficiency might be that the individual could perform the competency better and in less time than others in a specific environment. The highest level of proficiency or performance could be that the individual

is capable;e of teaching the competency. It is anticipated that only generic levels of proficiency can be established outside of single places of employment.

Mastery: A level of performance or achievement that meets a specified occupational standard.

Measure: A description of an outcome (Perkins).

Mediated Instruction: An instructional approach made up of a material/device/technique combination designed to achieve specified objectives.

Need: A measurable outcome discrepancy between "what is" and "what should be;" if there is no discrepancy, there is no need.

Needs Assessment: The process by which information is collected in a particular education/training situation to determine the nature of the problem; the process by which a discrepancy "what is" and "what should be" is determined.

Objective: Aim, end in view, or purpose of a course of action or belief; that which is anticipated as desirable in the early phases of an activity and serves to select, regulate, and direct later aspects of the activity so that the total process in designed and integrated.

Objective, Instructional: A definitive learning specification stated in behavioral terms: it states specifically what the student(s) should be able to do after having received the instruction.

Objective, Lesson: The focal point for everything in a properly prepared lesson: it describes the outcome or behavior to be developed by the learner.

Objective, Enabling: A description of lesson activities or learning experiences necessary for students to develop and demonstrate performance of a task: often used synonymously with lesson objective and learning experience.

Occupation: A specific occupation within an occupational division. A vocational instructor (teacher) is a specific occupation in the occupational division of education.

Occupational Competency: A service provided, a product produced, or a repair completed by work performed by an individual in an identifiable occupation in the workplace. Occupational competency is synonymous with: duty, job, function, and role of the occupation (position) in which an individual is employed.

Occupational Competency Mastery: The demonstration by a learner of the knowledge, attitude, judgement, and tasks required to produce a service, repair, or product at a predetermined standard established by the workplace.

Occupational Division: Divisions or occupational areas within an occupational field. Education is a division of the field of professional occupations.

Occupational Field: A categorical clustering of occupations such as professional occupations, agricultural occupations.

Outcome: Something that follows as a result or consequence. (Webster).

Outcome, Education: Change in behavior resulting from learning; not be confused with objective, which is a desired result.

Outcome, Measure: A desired outcome written in performance terms. i.e. - a description, written in performance terms, of what is expected of: (1) the student in relation to progress and outcome attainment or (2) the program in relation to proposed or mandated products, services, objectives, or goals. Attainment of occupational and/or academic competencies are examples of student outcomes.

Outcome, Standard: The levels or rate of the achievement of an outcome measure.

Performance: A clear statement of what the learner will be able to do after mastery status has been obtained.

Performance Stated Objective: An objective written in performance terms which describes: what activity the learner is to perform; the conditions under which the activity is to be performed; and the standard(s) by which the activity performed will be measured.

Performance Exam: An exam used to assess a student's mastery by demonstration, specified a performance, or outcome. When properly constructed, a performance exam can measure the knowledge, psychomotor skills, judgements, and attitudes required for the specific performance or outcome.

Proficiency: An indicator of ability to perform the activities within an occupation to the set standard. It may incorporate the ability to apply the relevant skills and knowledge to new situations within the occupational area as well as generic skills. (DOL, ED 1992)

Proficiency, Core: Indicates capabilities for performing activities that are common across occupational areas and can be built upon during the course of a career. (DOL, ED 1992)

Program Instructional: (1) An outline of the contemplated procedures, courses, and subjects offered by a school over a given period of time.

Program School: (1) The entire offerings of the school. Including the out-of-class activities, and the arrangement or sequences of subjects and activities; syn. educational program; (2) syn. program of studies.

Program Vocational/Technical: A planned sequence of courses and/or activities to meet an occupational training objective. As used in this project they are defined and coded in the Classification of Instructional Programs, NCES, 1981.

Psychomotor Domain: Skill performance and "hands on" manipulative objectives are included in the psychomotor domain.

Standard: The level or rate of an outcome. (Perkins)

Standard, Job-Related Industry Skill: Generally, is the identification of the knowledge, skill, and level of ability needed to satisfactorily perform a given job. (DOL, ED 1992)

Standard, Performance: A standard of performance describes the degree of proficiency that must be attained for each performance objective. It is the acceptable standard a student must meet if he or she is to attain a course competency.

System Approach: A process for effectively and efficiently achieving a required outcome based on documented needs; a self-correcting and logical methodology for decision making to be used in the design and development of man-made entities.

Technical Committee, Occupational: A committee composed of representatives of an occupation in the workplace who provide input into the development of a competency-based curriculum and the development of competency exams.

Terminal Performance Objective: The competency restated in performance terms: Contains a condition, a behavior, and a standard.

Task: A unit of work activity or operation that constitutes a logical and necessary step in the performance of a competency. For example:

Position/Occupation	Competency	Task
Electrician	Laying out residential wiring	Calculate lighting requirements

(DOL, ED 1992) Department of Labor and Department of Education, Federal Register Vol. 57, No. 53, March 18, 1992.

APPENDIX B

EXAMPLE OF SURVEY

APPENDIX B

EXAMPLE OF A SURVEY USED TO VALIDATE TASK/COMPETENCIES DEVELOPED BY AN OCCUPATIONAL ANALYSIS

READ THIS PAGE BEFORE GOING FURTHER

Have you completed the Background Information Section? Make sure, before you continue with this procedure.

PROCEDURE A. CHECKING TASKS OF PRESENT TEACHING ASSIGNMENT

1. As you read each task in the Task section, pages 1 through 9, place check beside task that you perform in your present assignment. Put your checkmark in the column headed "Check-If Done Now." When you have reached page 9, return to page 1.

2. DO NOT COMPLETE THE RIGHT-HAND COLUMN AT THIS TIME.

3. If a task that you perform is not listed anywhere in the entire list, write it on the blank page at the end of the booklet.

4. Do not confuse work you do yourself with work you supervise.

5. Remember, at this time you are to complete only the column headed "Check-If-Done Now" for pages 1 through 9. Now, turn to page 1 and BEGIN.

PROCEDURE B. RATING TIME SPENT ON TASKS ON PRESENT ASSIGNMENT

1. Have you checked each task that you perform in your present assignment? Make sure, before you continue with this procedure.

2. Now you are to rate the relative amount of time you spend performing each task in your present assignment. Relative time spent means the total time you spend doing the task compared with the time you spend on each of the other tasks of your present assignment during the year.

3. Use a rating of "1" if you spend "very much below average" amount of time on a task. Use a rating of "2" for "below average" time; and so on, up to a rating of "7" if you spend "very much above average" amount of time on the task.

4. Remember you are to rate only tasks that you have already checked in the first column of pages 1 through 9.

5. Place your rating according to the 7-point scale, in the right-hand column, headed "Time Spend Current Assignment."

6. When you have completed all your ratings in the right-hand column of pages 1 through 9, you will have completed this Job Inventory, and you may turn it in to your Director or Dean of Vocational-Technical Education.

7. An envelope is provided for returning the Job Inventory and it may be sealed before returning it to your director who will mail it.

APPENDIX B (continued)

JOB INVENTORY

Postsecondary Vocational-Technical Instructor's Competency List		Page 6 of 9
The task (competency you perform now ( ). In the "Time Spent" column, rate only those competencies you have checked ( ) in your present assignment. 1. Check ( ) only those competencies which you perform in your present assignment. 2. Do not rate any competencies until you have checked ( ) each competency that you perform. 3. Use numbers "1" through "7" to indicate the amount of time you spend on each competency which you have checked. ( )	Check IF DONE NOW	Estimated time spent on competencies in your assignment this year. 1. Very much below average 2. Below average 3. Slight below average 4. Average 5. Slightly above average 6. Above average 7. Very much above average

MANAGEMENT (Continued)

56. prepare purchase request for approved vocational equipment and supplies.	(37)		
57. structure a filing system for records and report forms used in a vocational course.	(38)		
58. supply administrators with data for vocational reports required by the state department of education	(39)		
59. provide approved safety apparel and devices for vocational students assigned to hazardous equipment.	(40)		
60. maintain a record of safety instruction presented in compliance with safety laws and regulations.	(42)		
61. uphold acceptable standards of student behavior in vocational classrooms and laboratories.	(43)		
62. maintain an inventory of vocational tools, supplies, and equipment assigned to the laboratory.	(44)		
63. establish a system for repairing and servicing tools and equipment in a vocational laboratory.	(45)		
64. arrange for the storage and security of vocational supplies and equipment.	(46)		
65. implement student "check-out" procedures for tools, supplies, and equipment used in the vocational laboratory.	(47)		
66. schedule laboratory equipment for maximum utilization by students.	(48)		

APPENDIX C

PERFORMANCE EXAMINATION SAMPLE

COMPUTER SCIENCE

MICROCOMPUTER APPLICATIONS

(STUDENT'S MANUAL)

(EXAMINER'S MANUAL)

STUDENT MANUAL

COMPETENCY EXAMINATION

COMPETENCY TO BE EXAMINED:

INTEGRATING WORD PROCESSING AND SPREADSHEET DOCUMENTS

COMPUTER SCIENCE

MICROCOMPUTING - RELATED OCCUPATIONS

DEVELOPED BY

DR. VANESSA EVANS HUSE - INSTRUCTOR

AND

MS. MARIBETH L. KING - INSTRUCTOR

KILGORE JUNIOR COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTION TO THE STUDENT

Competency: Integrating Word Processing and Spread Sheet Documents.

Performance Objective: The student will start spreadsheet and word processing software, create spreadsheet tables, create graphs from spreadsheet software, save spreadsheet tables and graphs in text format, integrate text documents and graphs and print integrated documents to perform integration of word processing and spreadsheet documents to demonstrate their proficiency of knowledge, achieving 90% accuracy.

1) The maximum time allowed for the exam is 1 hour and 30 minutes.

2) This part of the exam will consist of fourteen tasks.

3) For each task, you will be evaluated on your ability to perform the skills necessary for mastery of the competency.

4) This exam booklet, reference material, student printed material and diskette and supplemental equipment must be returned to the examiner before leaving the area.

5) After you have read the exam instructions, inform the examiner that you are ready to begin the exam.

Facility:

Computer Science Lab

Materials Needed:

Floppy diskette
Manuals for spreadsheets
Manuals for word processing
Textbooks of student's choice

Equipment:

Computer workstation with printer and installed DOS, word processing and spreadsheet software.

Time started: _____
Time finished: _____

COMPETENCY EXAMINATION

INTEGRATING WORD PROCESSING AND SPREADSHEET DOCUMENTS

PERFORMANCE EXAM:

TASK 1 Start the spreadsheet software.

TASK 2 Key in the following table:

SOFTWARE	NUMBER OF COPIES	PRICE	TOTAL
Quattro Pro 4.0	2 Lab Packs	600	1,200
Turbo Pascal 6	2 Lab Packs	450	900
Excel 4.0 for Window	1 Copy	320	320
Direct Access Menu System	120 Copies	42	5,040
WordPerfect 5.1	4 Lab Packs	269	1,076
OS/2 Ver 2.0	1 Copy	195	195
TOTAL NEEDED			$8,731

TASK 3 Save the table in a text format on the floppy disk provided.

TASK 4 Create a pie graph for the total column.

TASK 5 Save the graph in a text format on the floppy disk provided.

TASK 6 Exit the spreadsheet software.

TASK 7 Start the word processing software.

TASK 8 Type in the following memo:

TO: Ms. Betty Accountant
Business Office Manager

FROM: Ms. Susie Trainor
Continuing Education Coordinator

DATE: April 6, 1993

RE: Software Budget

This memo is to request additional budget amounts for software for new training courses. These new courses will begin September 1993 as requested by several major businesses in our area.

This table and accompanying graph explain my previous memo regarding budget request for software.

TASK 9 Save the document on the floppy disk provided.

TASk 10 Retrieve from the disk the text version of the spreadsheet table that you created in step 2. Insert this table under the completed memo you just created.

TASK 11 Retrieve from the disk the text version of the pie graph that you created in step 4. Insert this graph under the table retrieved in step 10.

TASK 12 Save the new integrated document on the floppy disk provided.

TASk 13 Send a copy of this integrated document to the printer. Make sure the document is presentable before printing.

TASK 14 Exit the word processing software.

EXAMINER MANUAL

COMPETENCY EXAMINATION

COMPETENCY TO BE EXAMINED:

INTEGRATING WORD PROCESSING

AND SPREADSHEET DOCUMENTS

COMPUTER SCIENCE

MICROCOMPUTING - RELATED OCCUPATIONS

DEVELOPED BY

DR. VANESSA EVANS HUSE - INSTRUCTOR

AND

MS. MARIBETH L. KING - INSTRUCTOR

KILGORE JUNIOR COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTION TO THE EXAMINER

Competency: Integrating Word Processing and Spreadsheet Documents.

Performance Objective: The student will start spreadsheet and word processing software, create spreadsheet tables, create graphs from spreadsheet software, save spreadsheet tables and graphs in text format, integrate text documents and graphs and print integrated documents to perform integration of word processing and spreadsheet documents to demonstrate their proficiency of knowledge, achieving 90% accuracy.

1) The maximum time allowed for the exam is 1 hour and 30 minutes.

2) There are fourteen tasks that the student must complete.

3) The examiner is to make sure that each student has a copy of the exam booklet, one floppy disk, installed DOS and application software and/or any reference books the student might want.

4) The examiner should clarify and questions before the testing begins.

5) Upon completion of the exam, collect exam booklets, diskette, and reference material and return to the appropriate administrator.

6) Record all ratings on the individual student competency rating sheet.

Facility:

Computer Science Lab

Materials Needed:

Floppy diskette
Manuals for spreadsheets
Manuals for word processing
Textbooks of student's choice

Equipment:

Computer workstation with printer and installed DOS, word processing and spreadsheet software.

Time started: _____
Time finished: _____

COMPETENCY EXAMINATION

INTEGRATING WORD PROCESSING AND SPREADSHEET DOCUMENTS

PERFORMANCE EXAM:

TASK 1 Start the spreadsheet software.

TASK 2 Key in the following table:

SOFTWARE	NUMBER OF COPIES	PRICE	TOTAL
Quattro Pro 4.0	2 Lab Packs	600	1,200
Turbo Pascal 6	2 Lab Packs	450	900
Excel 4.0 for Window	1 Copy	320	320
Direct Access Menu System	120 Copies	42	5,040
WordPerfect 5.1	4 Lab Packs	269	1,076
OS/2 Ver 2.0	1 Copy	195	195
TOTAL NEEDED			$8,731

TASK 3 Save the table in a text format on the floppy disk provided.

TASK 4 Create a pie graph for the total column.

TASK 5 Save the graph in a text format on the floppy disk provided.

TASK 6 Exit the spreadsheet software.

TASK 7 Start the word processing software.

TASK 8 Type in the following memo:

TO: Ms. Betty Accountant
Business Office Manager

FROM: Ms. Susie Trainor
Continuing Education Coordinator

DATE: April 6, 1993

RE: Software Budget

This memo is to request additional budget amounts for software for new training courses. These new courses will begin September 1993 as requested by several major businesses in our area.

This table and accompanying graph explain my previous memo regarding budget request for software.

TASK 9 Save the document on the floppy disk provided.

TASk 10 Retrieve from the disk the text version of the spreadsheet table that you created in step 2. Insert this table under the completed memo you just created.

TASK 11 Retrieve from the disk the text version of the pie graph that you created in step 4. Insert this graph under the table retrieved in step 10.

TASK 12 Save the new integrated document on the floppy disk provided.

TASk 13 Send a copy of this integrated document to the printer. Make sure the document is presentable before printing.

TASK 14 Exit the word processing software.

COMPETENCY EXAMINATION RATING SHEET

Competency: Integrating Word Processing and Spread Sheet Documents.

Performance Objective: The student will start spreadsheet and word processing software, create spreadsheet tables, create graphs from spreadsheet software, save spreadsheet tables and graphs in text format, integrate text documents and graphs and print integrated documents to perform integration of word processing and spreadsheet documents to demonstrate their proficiency of knowledge, achieving 90% accuracy.

STUDENT _____ Competency Mastered YES ____ NO ____

EXAMINER _____ Date of Rating _____

PERFORMANCE CRITERIA	STUDENT PERFORMANCE		
	Satisfactory	No. of Attempts	Completion Date
1. Started spreadsheet software.			
2. Keyed in table.			
3. Saved table in text format.			
4. Create pie graph.			
5. Saved graph in text format.			
6. Exited spreadsheet software.			
7. Started word processing software.			
8. Keyed in memo.			
9. Saved document.			

Comments:

(CONTINUED)
COMPETENCY EXAMINATION RATING SHEET

STUDENT _____ Competency Mastered YES ____ NO ____

EXAMINER _____ Date of Rating _____

PERFORMANCE CRITERIA	STUDENT PERFORMANCE		
	Satisfactory	No. of Attempts	Completion Date
10. Retrieved spreadsheet table.			
11. Retrieved spreadsheet table.			
12. Saved new document.			
13. Sent a integrated copy to printer.			
14. Exited word processing software.			

Comments:

APPENDIX D

PERFORMANCE EXAMINATION SAMPLE

DRAFTING

(STUDENT'S MANUAL)

(EXAMINER'S MANUAL)

STUDENT MANUAL

COMPETENCY EXAMINATION

COMPETENCY:

ESTABLISHING DRAWING LIMITS

DRAFTING---RELATED OCCUPATIONS

DEVELOPED BY

MR. JOHN DENISON - INSTRUCTOR

AND

DR. HARLEY DAVIS - LIAISON

BUSINESS AND INDUSTRY TECHNOLOGY

PARIS JUNIOR COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTIONS FOR THE STUDENT

Competency: Establishing Drawing Limits.

Performance Objective: Given specific kinds of drawings (Architectural, mechanical, or civil), the student will be able to set the limits of the drawing area, achieving 100% mastery on the performance exam.

1) The exam consists of eleven tasks. You will be rated for ability to calculate the lower left and upper right limits of certain types of drawings. Upon completion of each task, inform the examiner.

2) For each task you will be rated on your ability to perform skills necessary for CAD Drafters according to standard procedure.

3) The maximum time allowed for this exam is 15 minutes.

4) Upon completion of the exam, return the workstation to the hard disk manager. Return all equipment and materials provided for this exam to their proper location when finished.

5) The student exam booklet, any scrap work sheets, and all work sheets must be turned in to the examiner and checked.

Materials Needed:

1 pen or pencil
paper
3 1/2 or 5 1/4 high density diskette
calculator (optional)

Facility:

Computer Assisted Design Laboratory

Time started: _____
Time finished: _____

COMPETENCY EXAMINATION ON LIMITS

PERFORMANCE EXAM:

TASK 1 Enter the AutoCAD Drawing Editor using your user number. Any appropriate file name will do.

TASK 2 If you use AutoCAD's default settings, what is the size of the area on the screen on which you will be drawing? _____ x _____

TASK 3 Assume you are going to draw a drawing on an "A" size (11 x 8 1/2) sheet of paper. Go to the proper AutoCAD command and set the screen area for this exact sheet of paper.

TASK 4 Assume you have an architectural drawing whose overall dimensions are 125' x 56'. Go to the proper AutoCAD command and set the screen area for these exact dimensions.

TASK 5 Zoom all.

TASK 6 Set a grid to 2'.

TASK 7 Go to the proper AutoCAD command and set it so that you cannot draw outside the limits.

TASK 8 Exit the drawing editor. Do not save the drawing.

TASK 9 Enter the AutoCAD Drawing Editor using your user number. Any appropriate file name will do.

TASK 10 Assume you have a plot of land to draw. The over all boundaries of the plot are 2345' x 4000'. Set the drawing area of your screen so that you have 100' extra on each side. The lower left corner of the drawing will begin at 0,0.

TASK 11 Exit AutoCAD without saving your drawing.

EXAMINER MANUAL

COMPETENCY EXAMINATION

COMPETENCY:

ESTABLISHING DRAWING LIMITS

DRAFTING---RELATED OCCUPATIONS

DEVELOPED BY

MR. JOHN DENISON - INSTRUCTOR

AND

DR. HARLEY DAVIS - LIAISON

BUSINESS AND INDUSTRY TECHNOLOGY

PARIS JUNIOR COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTIONS FOR THE EXAMINER

Competency: Establishing Drawing Limits.

Performance Objective: Given specific kinds of drawings (Architectural, mechanical, or civil), the student will be able to set the limits of the drawing area, achieving 100% mastery on the performance exam.

1) Maximum time for the exam is 15 minutes.

2) There are eleven tasks that the student must perform.

   1) Enter the AutoCAD drawing editor.
   2) Identifies the default setting for limits. (12 x 9)
   3) Sets the proper limits for a sheet of paper 11 x 8.5.
   4) Sets the proper limits for a drawing that is 125' x 56'.
   5) Uses the zoom command to zoom all.
   6) Set a grid of 2'.
   7) Turns the limits on so that entities can not be drawn outside the limits.
   8) Exits the drawing editor without saving a drawing.
   9) Reenters the drawing editor.
   10) Sets the limits of a drawing so that the drafter will have space around the object he is drawing.
   11) Exit AutoCAD without saving the file.

3) All ratings should be made on individual students competency rating sheet.

4) Upon completion of the exam, verify that all testing materials are in your possession.

Materials Needed:

1 pen or pencil
paper
3 1/2 or 5 1/4 high density diskette
calculator (optional)

Facility:

Computer Assisted Design Laboratory

Time started: _____
Time finished: _____

COMPETENCY EXAMINATION ON LIMITS

PERFORMANCE EXAM:

TASK 1 Enter the AutoCAD Drawing Editor using your user number. Any appropriate file name will do.

TASK 2 If you use AutoCAD's default settings, what is the size of the area on the screen on which you will be drawing? _____ x _____

TASK 3 Assume you are going to draw a drawing on an "A" size (11 x 8 1/2) sheet of paper. Go to the proper AutoCAD command and set the screen area for this exact sheet of paper.

TASK 4 Assume you have an architectural drawing whose overall dimensions are 125' x 56'. Go to the proper AutoCAD command and set the screen area for these exact dimensions.

TASK 5 Zoom all.

TASK 6 Set a grid to 2'.

TASK 7 Go to the proper AutoCAD command and set it so that you cannot draw outside the limits.

TASK 8 Exit the drawing editor. Do not save the drawing.

TASK 9 Enter the AutoCAD Drawing Editor using your user number. Any appropriate file name will do.

TASK 10 Assume you have a plot of land to draw. The over all boundaries of the plot are 2345' x 4000'. Set the drawing area of your screen so that you have 100' extra on each side. The lower left corner of the drawing will begin at 0,0.

TASK 11 Exit AutoCAD without saving your drawing.

COMPETENCY EXAMINATION RATING SHEET

Competency: Establishing Drawing Limits.

Performance Objective: Given specific kinds of drawings (Architectural, mechanical, or civil), the student will be able to set the limits of the drawing area, achieving 100% mastery on the performance exam.

STUDENT _____ **Competency Mastered** YES ____ NO ____

EXAMINER _____ **Date of Rating** _____

PERFORMANCE CRITERIA	STUDENT PERFORMANCE		
	Satisfactory	No. of Attempts	Completion Date
1. Demonstrated ability to enter the AutoCAD main menu.			
2. Correctly identified AutoCAD's default limits as 12 x 9.			
3. Set the lower left limits to 0,0 and the upper right to 11 x 8.5.			
4. Set the lower left limits to 0,0 and the upper right to 125', 56'.			
5. Zoomed all to show all of area inside the limits.			
6. Correctly set grid to 2'.			
7. Set limits to "on" so that entities are not drawn outside boundaries.			
8. Exited AutoCAD drawing editor.			
9. Reentered drawing editor from main menu.			
10. Properly set the lower left limit to -100', -100' and the upper right to 2445', 4100'.			
11. Exited AutoCAD without saving the drawing.			

Comments:

APPENDIX E

PERFORMANCE EXAMINATION SAMPLE

FOOD PRODUCTION

(STUDENT'S MANUAL)

(EXAMINER'S MANUAL)

STUDENT MANUAL

COMPETENCY EXAMINATION

COMPETENCY:

BASIC SINGLE EGG PREPARATIONS

FOOD PRODUCTION - RELATED OCCUPATIONS

DEVELOPED BY

MS. JULIE SOUTHWORTH - INSTRUCTOR

TEMPLE HIGH SCHOOL

AND

MR. WILLIAM A. KAMMERER - INSTRUCTOR

CENTRAL TEXAS COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTION FOR THE STUDENT

Competency: Basic Single Egg Preparations.

Performance Objective: Given equipment and supplies, the student will perform five basic single egg preparations, within 45 minutes.

1) This exam consists of five tasks.

2) You will be rated on your ability to perform the skills necessary for the production of the five basic single egg preparations.

3) The maximum time allowed for this exam is 45 minutes.

4) Prepare the eggs using directions for each egg preparation.

5) Upon completion of the exam, the lab, all materials, and equipment must be returned to its pretest condition and checked by the examiner before you are given permission to leave the exam area.

6) Notify the examiner when you have completed the clean-up.

Materials Needed:

Instructions for egg preparations:
- Poached
- Hard-cooked
- Fried: Sunny side up and over easy
- Scrambled

Eggs
Butter or other cooking fat
Milk
Salt and pepper
Water

Equipment:

Saute pan, skillet or griddle
Medium saucepan
Wire whisk
Bowls
Plate and fork
Measuring spoons
Slotted spoon
Spatula
Timer

Time started:_____
Time finished:_____

COMPETENCY EXAMINATION

PERFORMANCE OF BASIC SINGLE EGG PREPARATIONS

PERFORMANCE EXAM:

TASK 1 PREPARATION OF HARD-COOKED EGG
According to directions given.

TASK 2 PREPARATION OF POACHED EGG
According to directions given.

TASK 3 PREPARATION OF FRIED EGG, SUNNY SIDE UP
According to directions given.

TASK 4 PREPARATION OF FRIED EGG, OVER EASY
According to directions given.

TASK 5 PREPARATION OF SCRAMBLED EGG
According to directions given.

EXAMINER MANUAL

COMPETENCY EXAMINATION

COMPETENCY:

BASIC SINGLE EGG PREPARATIONS

FOOD PRODUCTION - RELATED OCCUPATIONS

DEVELOPED BY

MS. JULIE SOUTHWORTH - INSTRUCTOR

TEMPLE HIGH SCHOOL

AND

MR. WILLIAM A. KAMMERER - INSTRUCTOR

CENTRAL TEXAS COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTION FOR THE EXAMINER

Competency: Basic Single Egg Preparations.

Performance Objective: Given equipment and supplies, the student will perform five basic single egg preparations, within 45 minutes.

1) The maximum time allowed for this exam is 45 minutes.

2) There are five tasks that the student must complete.

3) Prepare according to given recipe of formula.

4) Upon completion of the exam verify that all materials and equipment have been returned to pretest condition.

5) Clarify any questions before the examination begins.

6) Record all ratings on the individual student competency rating.

Materials Needed:

Instructions for egg preparations:
- Poached
- Hard-cooked
- Fried: Sunny side up and over easy
- Scrambled

Eggs
Butter or other cooking fat
Milk
Salt and pepper
Water

Equipment:

Saute pan, skillet or griddle
Medium saucepan
Wire whisk
Bowls
Measuring spoons
Slotted spoon
Spatula
Timer
Plate and fork

Time started:_____
Time finished:_____

COMPETENCY EXAMINATION

PERFORMANCE OF BASIC SINGLE EGG PREPARATIONS

PERFORMANCE EXAM:

TASK 1 PREPARATION OF HARD-COOKED EGG
According to directions given.

TASK 2 PREPARATION OF POACHED EGG
According to directions given.

TASK 3 PREPARATION OF FRIED EGG, SUNNY SIDE UP
According to directions given.

TASK 4 PREPARATION OF FRIED EGG, OVER EASY
According to directions given.

TASK 5 PREPARATION OF SCRAMBLED EGG
According to directions given.

COMPETENCY EXAMINATION RATING SHEET

Competency: Basic Single Egg Preparations.

Performance Objective: Given equipment and supplies, the student will perform five basic single egg preparations, within 45 minutes.

STUDENT _____ Competency Mastered YES ____ NO ____

EXAMINER _____ Date of Rating _____

PERFORMANCE CRITERIA	STUDENT PERFORMANCE		
	Satisfactory	No. of Attempts	Completion Date
1. Prepared hard-cooked egg according to directions with quality results.			
2. Prepared poached egg according to directions with quality results.			
3. Prepared fried egg, sunny side up, according to directions with quality results.			
4. Prepared fried egg, over easy, according to directions with quality results.			
5. Prepared scrambled egg, according to directions with quality results.			

Comments:

APPENDIX F

PERFORMANCE EXAMINATION SAMPLE

ELECTRONICS / INSTRUMENTATION

(STUDENT'S MANUAL)

(EXAMINER'S MANUAL)

STUDENT MANUAL

COMPETENCY EXAMINATION

COMPETENCY:

DETERMINING ALTERNATING CURRENT TIME-FREQUENCY VOLTAGE MEASUREMENT

ELECTRONICS / INSTRUMENTATION OCCUPATIONS

87

DEVELOPED BY

MR. JAMES MATSON - ELECTRONICS

INSTRUCTOR

VICTORIA INDEPENDENT SCHOOL DISTRICT

AND

MR. TAD STOKES - ELECTRONIC INSTRUMENTATION

INSTRUCTOR

VICTORIA COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTIONS FOR THE STUDENT

Competency: Determining Alternating Current Time-Frequency-Voltage Measurement.

Performance Objective: Given the proper tools and equipment, the student will demonstrate the ability to measure the time, frequency, and voltage from an oscilloscope display to current I.S.A. standards, achieving 100% mastery on the performance test.

1) The exam consists of five tasks.

2) You will be rated on your ability to perform each of the tasks, to current I.S.A. standards.

3) The maximum time allowed for the exam is 20 minutes.

4) When instructed by the examiner, return the work station to its pretest condition.

5) The student exam booklet, any scrap worksheets, and all equipment must be turned in to the examiner and checked before you are given permission to leave the exam area.

Materials Needed:

Variable A.C. generator
Oscilloscope
Calculator

Time started: _____
Time finished: _____

COMPETENCY EXAMINATION

DETERMINING ALTERNATING CURRENT TIME-FREQUENCY-VOLTAGE MEASUREMENT

PERFORMANCE EXAM:

TASK 1 PERIOD MEASUREMENT

1) Randomly set the generator value.
2) Attach the oscilloscope leads.
3) Adjust the Time/Division controls until a useable sine wave appears on screen.
4) Measure and record the period.

TASK 2 FREQUENCY MEASUREMENT

1) Using the sine wave displayed for TASK 1 measure and record the frequency of the sine wave.

TASK 3 PEAK TO PEAK VOLTAGE MEASUREMENT

1) Using the sine wave displayed and the VOLTS/DIVISION controls, measure and record the PEAK TO PEAK voltage displayed.

TASK 4 PEAK VOLTAGE MEASUREMENT

1) Using the sine wave displayed and the VOLTS/DIVISION controls, measure and record the PEAK VOLTAGE.

TASK 5 RMS VOLTAGE CALCULATIONS

1) Using the value measured in TASK 4 calculate and record the RMS voltage rhe sine wave represents.

EXAMINER MANUAL

COMPETENCY EXAMINATION

COMPETENCY:

DETERMINING ALTERNATING CURRENT TIME-FREQUENCY VOLTAGE MEASUREMENT

ELECTRONICS / INSTRUMENTATION OCCUPATIONS

91

DEVELOPED BY

MR. JAMES MATSON - ELECTRONICS

INSTRUCTOR

VICTORIA INDEPENDENT SCHOOL DISTRICT

AND

MR. TAD STOKES - ELECTRONIC INSTRUMENTATION

INSTRUCTOR

VICTORIA COLLEGE

FOR

PARIS JUNIOR COLLEGE

JUNE, 1993

SPECIFIC INSTRUCTIONS FOR THE EXAMINER

Competency: Determining Alternating Current Time-Frequency-Voltage Measurement.

Performance Objective: Given the proper tools and equipment, the student will demonstrate the ability to measure the time, frequency, and voltage from an oscilloscope display to current I.S.A. standards, achieving 100% mastery on the performance test.

1) The maximum time allowed for the exam is 20 minutes.

2) There are five tasks that the student must perform.

3) Prepare according to given instruction or formula.

4) Upon completion of the exam, verify that all testing materials and equipment have been returned to pretest condition.

5) Clarify any questions before the exam begins.

6) Record all ratings on the individual student competency rating sheet.

Materials Needed:

Variable A.C. generator
Oscilloscope
Calculator

Time started: _____
Time finished: _____

COMPETENCY EXAMINATION

DETERMINING ALTERNATING CURRENT TIME-FREQUENCY-VOLTAGE MEASUREMENT

PERFORMANCE EXAM:

TASK 1 PERIOD MEASUREMENT

1) Randomly set the generator value.
2) Attach the oscilloscope leads.
3) Adjust the Time/Division controls until a useable sine wave appears on screen.
4) Measure and record the period.

TASK 2 FREQUENCY MEASUREMENT

1) Using the sine wave displayed for TASK 1 measure and record the frequency of the sine wave.

TASK 3 PEAK TO PEAK VOLTAGE MEASUREMENT

1) Using the sine wave displayed and the VOLTS/DIVISION controls, measure and record the PEAK TO PEAK voltage displayed.

TASK 4 PEAK VOLTAGE MEASUREMENT

1) Using the sine wave displayed and the VOLTS/DIVISION controls, measure and record the PEAK VOLTAGE.

TASK 5 RMS VOLTAGE CALCULATIONS

1) Using the value measured in TASK 4 calculate and record the RMS voltage rhe sine wave represents.

COMPETENCY EXAMINATION RATING SHEET

Competency: Determining Alternating Current Time-Frequency-Voltage Measurement.

Performance Objective: Given the proper tools and equipment, the student will demonstrate the ability to measure the time, frequency, and voltage from an oscilloscope display to current I.S.A. standards, achieving 100% mastery on the performance test.

STUDENT _____ Competency Mastered YES ____ NO ____

EXAMINER _____ Date of Rating _____

PERFORMANCE CRITERIA	STUDENT PERFORMANCE		
	Satisfactory	No. of Attempts	Completion Date
1. Period measurement.			
2. Frequency measurement.			
3. Peak to peak voltage measurement.			
4. Peak voltage measurement.			
5. RMS voltage calculation.			

Comments:

APPENDIX G

PROGRAM GRANTS ISSUED

BY THE

U.S. DEPARTMENT OF EDUCATION

AND

U.S. DEPARTMENT OF LABOR

U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

PROJECT ABSTRACTS

FOR THE

BUSINESS AND EDUCATION STANDARDS PROGRAM

FY 1992

Debra J. Nolan
Project Director
(202) 205-9650

FACT SHEET

PROGRAM TITLE: **Business and Education Standards Program** (CFDA #84.244). Authorized under section 416 of the Carl D. Perkins Vocational and Applied Technology Education Act and integrally related to America 2000: The President's Education Strategy.

PROGRAM DESCRIPTION: The purpose of this program is to provide a program of grants for organizing and operating business-labor-education technical committees. The committees established shall propose national standards for competencies in industries and trades. Such standards shall at least include standards for: (1) major divisions or specialty areas identified within occupations studied; (2) minimum hours of study to be competent in such divisions or specialty areas; (3) minimum tools and equipment required in such divisions or specialty areas; (4) minimum qualifications for instructional staff; and (5) minimum tasks to be included in any course of study purporting to prepare individuals for work in such divisions or specialty areas.

APPLICANT ELIGIBILITY: (1) Industrial trade associations; (2) Labor organizations; (3) National joint apprenticeship committees; (4) Comparable national organizations, such as educational associations, industry councils, business and industry organizations, and private national research organizations.

FY 91 APPROPRIATION: $3.5 million for an estimated 7 new grant awards of approximately $500,000 for an 18 month initial grant, to be followed by a non-competing continuation of the grant, for an additional 18 month period.

A "Notice Inviting Applications" was published in the Federal Register on June 3, 1992. The Department funded seven projects from this first competition on September 30, 1992.

FY 92 APPROPRIATION: The FY 1992 competition was published in its entirety (instructions, forms, etc.) in the Federal Register on September 30, 1992 with a November 20th deadline for receiving applications into the Department. It is anticipated that nine new projects will be awarded from this competition by April 1993.

PROGRAM MANAGER: Additional information regarding the competition timelines can be secured from the program manager.

Debra J. Nolan
Senior Program Advisor
Business and Education Standards
ED/OVAE/DNP
Room 4512 Switzer Building
330 C St. S.W.
Washington, D.C. 20202-7242
Telephone: (202) 205-9650

U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

1. PROGRAM TITLE: Business and Education Standards Program

2. PROJECT TITLE: Development of National Standards for Competencies in Computer Aided Drafting (CAD)

3. AWARD NUMBER: V244A20003

4. PROJECT DIRECTOR/ AWARDEE/ ADDRESS/ TELEPHONE:
Jane Beardsworth
Foundation for Industrial Modernization (FIM)
1331 Pennsylvania Ave, NW
Suite 1500, North Tower
Washington, DC 20004-1703
(202) 662-8970 / fax (202) 637-3182

5. FUNDS BY FISCAL YEAR:
Federal: FY 1992 $546,687 (1st 18 months)
50% Matching funds: $724,195 (1st 18 months)

6. AWARD PERIOD: November 1, 1992 - October 31, 1995
(two 18 month grant cycles)

7. FEDERAL PROJECT OFFICER: Debra J. Nolan, Business and Education Standards
(202) 205-9650

8. OBJECTIVES: To organize and operate business-labor-education technical committees that will propose national standards for competencies in the computer aided drafting cluster.

9. PROCEDURES: Working in conjunction with the National Coalition for Advanced Manufacturing, and through a collaborative voluntary effort of the manufacturing industry, trade associations, educators, labor and other educators, FIM proposes to develop standards for job skill competencies, a testing and individual certification system for Computer Aided Drafting Cluster of Occupations.

10. OUTCOMES/RESULTS/PRODUCTS: National standards and certification system for Computer Aided Drafting cluster of occupations.

11. EDUCATIONAL LEVEL: Secondary, Postsecondary, and Adult

12. TARGET POPULATION: State and local education and training institutions, industry associations, unions, state and federal education and training policy makers.

13. ESTIMATED NUMBER OF TRAINEES: N/A

14. PARTNERS:
- o National Coalition for Advanced Manufacturing and affiliate organizations
- o AFL-CIO (Industrial Union Department)
- o National Vocational Technical Education Foundation
- o National Association of State Directors of Vocational Technical Education Consortium
- o CIM in Higher Education
- o other coalition members of industry and education

SKILL STANDARDS GRANTEES

DEPARTMENT OF LABOR

Industry	Grantee
Industrial Launderers	Institute of Industrial Launderers Washington, D.C.
Tourism, Travel and Hospitality	Council on Hotel, Restaurant and Institutional Education, Washington, D.C.
Metalworking	National Tooling and Machining Association, Ft. Washington, Md.
Electronics	American Electronics Association, Santa Clara, Calif.
Electrical Construction	National Electrical Contractors Association, Bethesda, Md.
Retail Trade	National Retail Federation, Washington, D.C.

DEPARTMENT OF EDUCATION

Health Science and Technology	Far West Lab for Educational and Research and Development, San Francisco, Calif.
Electronics	Electronics Industries Foundation, Washington, D.C.
Computer-aided drafting	Foundation for Industrial Modernization, Washington, D.C.
Air conditioning, Refrigeration and Power	Southern Association of Colleges and Schools - V[illegible] (Vocational-Technical Education Consortium of St[illegible]
Biotechnical Sciences	Education Development Center, Newton, Mass.
Printing	The Graphic Arts Technical Foundation, Pittsburgh, Pa.
Automotive, Auto-Body and Truck Technicians	National Automotive Technicians Education Foundation, Herndon, Va.

U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

1. PROGRAM TITLE: Business and Education Standards Program

2. PROJECT TITLE: Developing National Health Science and Technology Business and Education Standards

3. AWARD NUMBER: V244A200015

4. PROJECT DIRECTOR/ AWARDEE/ ADDRESS/ TELEPHONE: Sri Ananda
Far West Lab for Educational Research and Development
730 Harrison St.
San Francisco, CA 94107-1242
(415) 565-3070 / fax (415) 565-3012

5. FUNDS BY: FISCAL YEAR: Federal: FY 1992 $500,000 (1st 18 months)
50% Matching funds: $534,409 (1st 18 months)

6. AWARD PERIOD: November 1, 1992 - October 31, 1992
(two 18-month grant cycles)

7. FEDERAL PROJECT OFFICER: Debra J. Nolan, Business and Education Standards
(202) 205-9650

8. OBJECTIVES: Develop national world class health science and technology standards that can serve as a model for both education and business and is compatible with other vocational efforts such as, America 2000, Carl D. Perkins Act and SCANS. The project will establish standards and exemplary assessments for a variety of occupations in the general health science and technology core. Standards will include job-specific, general employability, and academic skills.

9. PROCEDURES: Working in conjunction with the National Consortium of Health Science and Technology, and through a collaborative voluntary effort of the health industry, professional associations, educators, labor and others, FWL proposes to develop standards for job skill competencies in health field.

10. OUTCOMES/RESULTS/PRODUCTS: Eight occupational clusters will be targeted for standards and assessment development: Dental Auxiliary Services, Medical Management Services, Health Care Information Technology Services, Emergency Medical Technology Services, Nursing Services, Diagnostic Services, Therapeutic Services, and Supportive Services. Six specific occupations will be considered for development of national standards: medical office assistant, radiologic technologist, homemaker-home health aide, medical-records technician, medical secretary, and surgical technologist.

11. EDUCATIONAL LEVEL: Secondary, Postsecondary, and Adult

12. TARGET POPULATION: State and local education and training institutions, industry associations, unions, state and federal education and training policy makers.

13. ESTIMATED NUMBER OF TRAINEES: N/A

14. PARTNERS:
- National Consortium of Health Science and Technology Education
- Service Employees International Union of the AFL-CIO
- MPR Associates
- American Hospital Association
- Kaiser Permanente
- American Society for Healthcare Human Resources Administration
- Health Occupations Students of America
- American Vocational Association
- California Department of Education

U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

1. PROGRAM TITLE: Business and Education Standards Program

2. PROJECT TITLE: Creating Skill Standards for Entry into the Bioscience Industry: Beginning and Mid-level Laboratory Practitioners

3. AWARD NUMBER: V244A20011

4. PROJECT DIRECTOR/ AWARDEE/ ADDRESS/ TELEPHONE: Dr. Judith Leff
Education Development Center (EDC)
55 Chapel St.
Newton, MA 02160
(617) 969-7100 / fax (617) 244-3436

5. FUNDS BY FISCAL YEAR: Federal: FY 1992 $527,383 (1st 18 months)
50% Matching funds: $527,455 (1st 18 months)

6. AWARD PERIOD: October 1, 1992 - September 30, 1995
(two 18-month grant cycles)

7. FEDERAL PROJECT OFFICER: Debra J. Nolan, Business and Education Standards
(202) 205-9650

8. OBJECTIVES: Organize and operate a business-labor-education technical committee that will propose national standards for competencies for entry-level laboratory technicians in the biotechnical sciences area. The bioscience industry comprises basic research laboratories, clinical laboratories, and pharmaceutical and biotechnology companies.

9. PROCEDURES: Working in conjunction with the American Society for Medical Technology and through a collaborative voluntary effort of the Bioscience Industry, professional associations, vocational educators, labor and others, EDC proposes to develop standards for entry and mid-level labatory-based technical occupations in the bioscience industry.

10. OUTCOMES/RESULTS/PRODUCTS: Research technician, medical lab technician, quality control technician, animal technician, media prep technician, equipment prep technician, and manufacturing technician.

11. EDUCATIONAL LEVEL: Secondary, Postsecondary, and Adult

12. TARGET POPULATION: State and local education and training institutions, industry associations, unions, state and federal education and training policy makers.

13. ESTIMATED NUMBER OF TRAINEES: N/A

14. PARTNERS:
- o American Society for Medical Technology
- o American Hospital Association
- o Service Employees International Union AFL-CIO
- o Industrial Biotechnology Association
- o American Chemical Society
- o National Council for Occupational Education
- o National Association of State Directors of Vocational Technical Education Consortium, and others.

U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

1. PROGRAM TITLE: Business and Education Standards Program

2. PROJECT TITLE: Organization and Operation of Technical Committees to Develop National Skill Standards for Competency in the Electronics Industry

3. AWARD NUMBER: V244A20012

4. PROJECT DIRECTOR/ AWARDEE/ ADDRESS/ TELEPHONE: Irwin Kaplan
Electronic Industries Foundation
919 18th Street
Washington, DC 20006
(202) 955-5814 / fax (202) 955-5837

5. FUNDS BY FISCAL YEAR: Federal: FY 1992 $545,658 (1st 18 months)
50% Matching Funds: $545,658 (1st 18 months)

6. AWARD PERIOD: October 1, 1992 - September 30, 1995
(two 18-month grant cycles)

7. FEDERAL PROJECT OFFICER: Debra J. Nolan, Business and Education Standards
(202) 205-9650

8. OBJECTIVES: Organize and operate a business-labor-education technical committee that will propose national standards for the academic, theoretical, occupational, and employability competencies for electronics technicians.

9. PROCEDURES: Working in conjuction with the Electronics Industries Association, and through a collaborative voluntary effort of the electronics industry, trade associatons, educators, labor and others, EIF proposes to develop standards for job skill competencies for electronics technicians.

10. OUTCOMES/RESULTS/PRODUCTS: National Standards and Certification System for the following areas: Consumer electronics technician, communications technician, computer/data processing technician, industrial/commercial technician, engineering technician, automotive electronics technician.

11. EDUCATIONAL LEVEL: Secondary, Postsecondary, and Adult

12. TARGET POPULATION: State and local education and training institutions, industry associations, unions, state and federal education and training policy makers.

13. ESTIMATED NUMBER OF TRAINEES: N/A

14. PARTNERS:
- o Electronic Industries Association
- o International Association of Machinists and Aerospace Workers
- o National Electronic Service and Sales Dealers of America,
- o International Society of Certified Electronic Technicians
- o National Association of State Directors of Vocational Technical Education Consortium
- o Vocational Industrial Clubs of America
- o International Vocational Training Organization

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U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

1. PROGRAM TITLE: Business and Education Standards Program

2. PROJECT TITLE: Developing Business and Education Standards for the Printing Industry

3. AWARD NUMBER: V244A20013

4. PROJECT DIRECTOR/ AWARDEE/ ADDRESS/ TELEPHONE:
John Burgess
The Graphic Arts Technical Foundation
4615 Forbes Avenue
Pittsburgh, PA 15213-3796
(412) 621-6941 / fax (412) 621-3049

5. FUNDS BY: FISCAL YEAR:
Federal: FY 1992 $516,127 (1st 18 months)
50% Matching funds: $551,342 (1st 18 months)

6. AWARD PERIOD: October 1, 1992 - September 30, 1995
(two 18-month grant cycles)

7. FEDERAL PROJECT OFFICER:
Debra J. Nolan, Business and Education Standards
(202) 205-9650

8. OBJECTIVES: To organize and operate business-labor-education technical committees that will propose national standards for competencies in the Printing Industry.

9. PROCEDURES: Develop skill standards, establish assessments, formulate certification procedures, develop validation procedures, and develop proposals for curriculum and training/education programs for all occupations within two job clusters -- e.g., pre-press and press--within the printing industry. GATF proposes to translate standards into testable competencies and disseminate information to advance industry participation and buy-in. Develop an electronic network for the industry that gives access to subscribers of the standards, task analysis, and other information.

10. OUTCOMES/RESULTS/PRODUCTS: National Standards and Certificatin System for the following areas: scanner operator, plate maker, image assembler, camera operator, stripper, proof reader, typesetter, press operator, binder, graphic designers and artists.

11. EDUCATIONAL LEVEL: Secondary, Postsecondary, and Adult

12. TARGET POPULATION: State and local education and training institutions, industry associations, unions, state and federal education and training policy makers.

13. ESTIMATED NUMBER OF TRAINEES: N/A

14. PARTNERS:
- o Printing Industries of America
- o Graphic Communications International Union
- o BW and Associates
- o Far West Labs
- o California Business Roundtable
- o Council of Great Lakes Governors
- o Institute for Education and the Economy

U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

1. PROGRAM TITLE: Business and Education Standards Programs

2. PROJECT TITLE: Developing National Standards in the Air Conditioning, Refrigeration, and Power Industries using the Capabilities and Resources of the Vocational-Technical Education Consortium of States and its Industry Partners.

3. AWARD NUMBER: V244A20004

4. PROJECT DIRECTOR/ AWARDEE/ ADDRESS/ TELEPHONE: Victor Harville
Southern Association of Colleges and Schools - VTECS
(Vocational-Technical Education Consortium of States)
1866 Southern Lane
Decatur, GA 30033-4097
(800) 248-7701, (404) 679-4500 / fax (404) 679-4556

5. FUNDS BY: FISCAL YEAR: Federal: FY 1992 $ 253,070 (1st 18 months)
50% Matching funds: $ 253,070 (1st 18 months)

6. AWARD PERIOD: October 1, 1992 - September 30, 1995
(two 18-month grant cycles)

7. FEDERAL PROJECT OFFICER: Debra J. Nolan, Business and Education Standards
(202) 205-9650

8. OBJECTIVES: V-TECS proposes to Develop National Standards in the Air Conditioning, Refrigeration, and Power Industries.

9. PROCEDURES: Working in conjunction with the National Association of Power Engineers and through a collaborative voluntary effort of industry partners, trade associations, educators, labor and others, V-TECS proposes to:

a) identify and verify the major competencies, standards and certification requirements for the development of a world class work force in the air-conditioning, refrigeration, and power industries.
b) Share the V-TECS expertise and resources with other applicants that may not have the technical capabilities to do occupational analysis, instructional design and assessment.
c) Simultaneously work with the 22 member states of V-TECS.

10. OUTCOMES/RESULTS/PRODUCTS: National Standards and Certification System for the following areas: domestic air conditioning, commercial air conditioning, and refrigeration with special emphasis on those who install, operate and maintain the systems.

11. EDUCATIONAL LEVEL: Secondary, Postsecondary, and Adult

12. TARGET POPULATION: State and local education and training institutions, industry associations, unions, state and federal education and training policy makers.

13. ESTIMATED NUMBER OF TRAINEES: N/A

14. PARTNERS:
- o National Association of Power Engineers
- o International Union of Operating Engineers
- o National Association of State Directors of Vocational Technical Education Consortium

U.S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION (OVAE)
DIVISION OF NATIONAL PROGRAMS (DNP)

1. PROGRAM TITLE: Business and Education Standards Program

2. PROJECT TITLE: Development of Standards for Job Skill Competence in Each Specialty Area of Automotive, Autobody, and Truck Technician Occupations under the Business and Education Standards Program.

3. AWARD NUMBER: V244A20010

4. PROJECT DIRECTOR/ AWARDEE/ ADDRESS/ TELEPHONE: Pat Lundquist
National Automotive Technicians Education Foundation
13505 Dulles Technology Dr.
Herdon, VA 22071
(703) 713-3800 / fax 703-713-0727

5. FUNDS BY FISCAL YEAR: Federal: FY 1992 $544,537 (1st 18 months)
50% Matching funds: $544,537 (1st 18 months)

6. AWARD PERIOD: October 1, 1992 - September 30, 1995
(two 18-month grant cycles)

7. FEDERAL PROJECT OFFICER: Debra J. Nolan, Business and Education Standards
(202) 205-9650

8. OBJECTIVES: To organize and operate business-labor-education technical committees that will propose national standards for competencies in the automotive and truck repair and autobody industries.

9. PROCEDURES: Working in conjunction with the National Institute for Automotive Service Excellence (ASE), and through a collaborative voluntary effort of the automotive industry, trade associations, educators, labor and other educators, NATEF proposes to develop standards for job skill competencies in each of the specialty areas of automotive, auto body and truck technician occupations. NATEF will also identify the principles of applied mathematics, science and reading which will become the basis for a certificate for basic mastery for persons wishing to enter entry-level training in automotive, auto body or truck technician training programs.

10. OUTCOMES/RESULTS/PRODUCTS: National Standards and Certification System for the following areas: Automotive, Autobody and Truck Technician occupations such as: Engine repair, automatic transmission and transaxle, manual drive train and axles, suspension and steering, brakes, electrical systems, heating and air-conditioning, engine performance, non-structural analysis and damage repair, structural analysis and damage repair, mechanical and electrical components, plastics and adhesives, painting and refinishing, truck gasoline and diesel engine repair.

11. EDUCATIONAL LEVEL: Secondary, Postsecondary, and Adult

12. TARGET POPULATION: State and local education and training institutions, industry associations, unions, state and federal education and training policy makers.

13. ESTIMATED NUMBER OF TRAINEES: N/A

14. PARTNERS:
- Inter-Industry Conference on Auto Collision Repair
- International Associaton of Machinists and Aerospace Workers
- National Institute for Automotive Service Excellence
- Ohio State University Research Foundation
- National State Directors of Vocational Technical Education Consortium

A STUDY OF BUSINESS AND EDUCATION SKILL STANDARDS

The U.S. Department of Education's Division of National Programs of the Office of Vocational and Adult Education has awarded a contract to the Institute for Educational Leadership (IEL) to conduct a multi-phased study to provide a review of occupational skill standards, competency, and certification programs that exist in the United States.

The project will provide baseline information on:

- → Education driven skill standards systems for secondary, post-secondary, and private technical schools and multi-state consortia; and,
- → The efforts of industry associations, unions and professional societies.

The project will include a comparative analysis of skill standard systems in other countries that may affect their international competitiveness position relative to the U.S.

Common "Organizational Topics" will be used throughout the analysis. These are:

1. A description of the system -- who is served, how the processes work, who is responsible for what parts of the system.
2. The extent of the coverage -- by type of industry and occupations.

For up to 30 skill standard setting systems more indepth information will be made avaliable. This includes:

3. The historical development -- what were and continue to be the driving forces or incentives for the support of employers and workers for the system.
4. The Partners' Role and Responsibilities -- multiple actors effect each of the systems (i.e. education institutions, industry associations, individual employers, accrediting bodies, labor organizations, apprenticeship programs, and government) how they are knitted together will be described.
5. The Standard Setting Process -- how standards are set differ and will be described.
6. The Occupational Analysis Processes -- how skills for jobs and occupational groupings are determined will be described.
7. The Assessment Processes -- how assessment is conducted, what types of insturements are used, how the insturements are maintained and updated will be documented.
8. The Instructional Approaches -- the role of industry in the development of curricula, the delivery of instruction, the selection and training of instructors will be described.
9. The Processes for Maintaining and Updating -- The capacity for adaption to change will be addressed.
10. How Information is Shared and Used -- the "need to know" issues of the various partners will be explored.

The U.S.Department of Education recognized the need for this type of study in order to assist states and educational institutions refine their educational offerings to meet the needs of employers.

It is also the intent of the Department that the study will help inform the joint effort of the U.S. Departments of Labor and Education in spearheading a public-private partnership between industry, labor and education to develop a national voluntary skills standards system for this country.

IEL's Team includes the National Vocational Technical Education Foundation, the Center for Policy Research of the National Governors' Association, and Meridian Corporation.

IEL Project Director: Joan Wills (202) 822-8405
Federal Project Officer: Debra Nolan (202) 205-9650

APPENDIX H

SELECTED REFERENCES

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